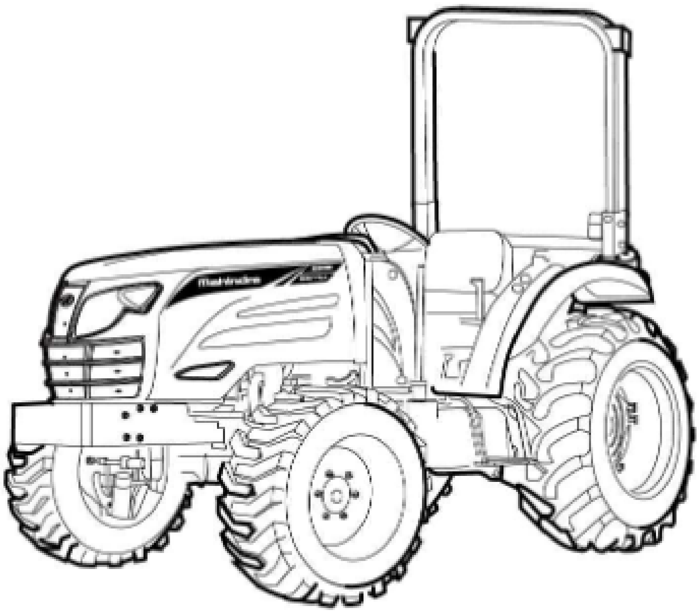
Mahindra
Rise.

Mahindra
TRACTORS

WORKSHOP MANUAL
2655 HST



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TRACTORS

2655 HST

workshop manual

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Chapter 1 .Introduction

This tractor workshop manual is for qualified service personnel engaged in servicing and overhauling 2655 HST tractor. Use of this publication is not recommended for field operators since they usually do not have access to special tools and shop equipment essential for most servicing.

Servicing procedures outlined herein contain sufficient information to return all component parts of a tractor to new condition. In discussion of each component parts, it is assumed that a complete overhaul is been performed, consequently,

complete disassembly and reassembly are outlined. The mechanic is relied upon to decide how far disassembly must be carried when complete overhaul is not required.

Study unfamiliar service procedures thoroughly and clearly understood before attempting disassembly. Specific data essential for proper overhaul, such as running clearances and torque values, have been provided in interline of Inspection and reassembly procedures of each group section.

This manual was compiled from latest information available at time of publication.

Manufacturer reserves the right to make changes at any time without notice.

Whenever the terms "left“ and "right" are used, They means as viewed by the operator when seated in the operator's seat.

SAFETY INSTRUCTION

ALWAYS PRACTICE SAFETY BY THINKING BEFORE ACTION AVOID FIRE HAZARDS.

-Keep fire extinguishers easily available and in good operating condition.

All relevant personnel should know how to operate fire fighting equipment.

-Keep a first aid kit in an easily accessible location.

-Do not smoke while handling fuel, or other highly flammable material.

-Do not use an open pail for transporting fuel.

-Use of an approved fuel container.

-Dispose of all fuel-soaked rags in covered containers where cigarettes cannot be dropped carelessly.

-Do not smoke and avoid open flame when charging, jumping, or boosting batteries.

-Batteries give off gas which is flammable and explosive.

-Do not charge batteries in a closed area. Provide proper ventilation to avoid explosion of accumulated gases. Avoid acid burns.

-Wear safety goggles when handling battery electrolyte. It contains sulfuric acid which is a poison and can cause blindness. Avoid it contacting eyes, skin, or clothing. sulfuric acid will eat through clothing and can cause severe burns to skin.

AVOID HIGH-PRESSURE FLUIDS

1) Before beginning work on hydraulic system components, turn off engine and operate hydraulic control levers to relieve internal hydraulic pressure.

2) Oil under pressure can penetrate skin and lead to personal injury. Treat sources of oil pressure with extreme care, wearing safety goggles.

3) If hydraulic leak develops, correct immediately. Escaping hydraulic oil can have extremely high pressure. A stream of high pressure oil may easily penetrate skin just like modern needless vaccination equipment, but with the exception that hydraulic fluid may cause blood poisoning.

It is imperative that connections are tight and that all lines and pipes should be in good condition.

If injured by escaping hydraulic fluid, see a doctor at once.

STAY CLEAR OF PTO

1) Entanglement in rotating drive line can cause serious injury or death.
2) Keep tractor master shield and drive line shield in place at all times except for special applications as directed in the implement operator's manual.

3) Wear fairly tight fitting clothing. Stop the engine and be sure PTO driveline is stopped before making adjustment, connections, or cleaning out PTO drive equipment.

SERVICE TIRES SAFELY

Tire changing can be dangerous and should be done by trained personnel using proper tools and equipment.

Do not re-inflate a tire that has been run flat or seriously under-inflated. Have it checked by qualified personnel.

Use wheel handling equipment adequate for weight involved when removing and installing wheels.

WARNING SIGNS IN THIS MANUAL

The following warning symbols in this manual draw additional attention to items of importance for the safe and correct operation of the tractor.

SIGN	MEANING OF SIGN
⚠ **DANGER**	Serious hazard with a very high level of risk of either serious injury or death
⚠ **WARNING**	Hazard or unsafe practice that can lead to severe injury or death.
⚠ **CAUTION**	Hazard or unsafe practice that can lead in injury or death.
✚ **IMPORTANT**	Instructions for the correct operation of the machine which, if followed, will ensure that it performs at it's best

SAFETY SIGNS

RECOGNIZE SAFETY INFORMATION

This symbol, Safety-Alert Symbol, means ATTENTION! YOUR SAFETY IS INVOLVED. The message that follows the symbol contains important information about safety. Carefully read the message

SIGNAL WORDS.

A signal word—**DANGER, WARNING OR CAUTION—**is used with safety alert symbol.

DANGER identifies the most serious hazards. Safety signs with signal Word —DANGER OR WARNING—are typically near specific hazards. General precautions are listed on CAUTION safety signs.

⚠ **DANGER**

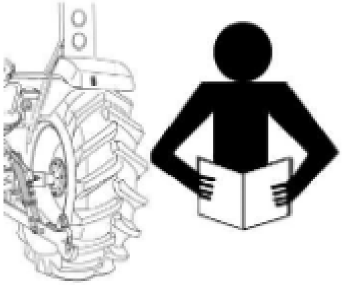
⚠ **WARNING**

⚠ **CAUTION**

READ SAFETY INSTRUCTION

Carefully read all safety instructions given in this manual for your safety. Tempering with any of the safety devices can cause serious injuries or death. Keep all safety signs in good condition. Replace missing or damaged safety signs.

Keep your tractor in proper condition and do not allow any unauthorized modifications to be carried out on the Tractor, which may impair the function/safety and affect Tractor life.



PROTECTION CHILDREN

Keep children and others away from the Tractor while operating.

BEFORE YOU REVERSE

- Look behind Tractor for children.
- Do not let children to ride on Tractor or any implement.

USE OF ROPS AND SEAT BELT

The Roll over Protection Structure (ROPS) has been certified to industry and/or government standards. Any damage or alternation to the ROPS, mounting hardware, or seat belt voids the certification and will reduce or eliminate protection for the operator in the event of a roll-over. The ROPS, mounting hardware, and seat belt should be checked every service for any evidence of damage, wear or cracks. In the event of damage or alteration, the ROPS must be replaced prior to further operation of the Tractor.

The seat belt must be worn during machine operation when the machine is equipped with a certified ROPS.

Failure to do so will reduce or eliminate protection for the operator in the event of a roll-over.

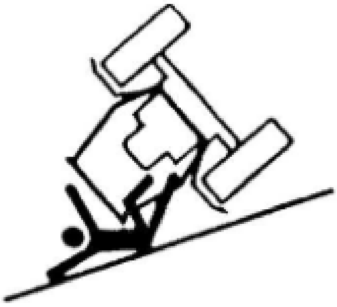
PRECAUTION TO AVOID TIPPING

Do not drive where the Tractor could slip or tip.

Stay alert for holes and rocks in the terrain, and other hidden hazards.

Slow down before you make a sharp turn.

Driving forward out of a ditch or mired condition could cause Tractor to tip over backward. Back out of these situations if possible



PARK TRACTOR SAFELY

Before working on the Tractor ;

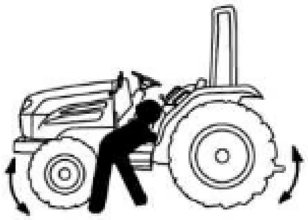
Lower all equipment to the ground.

Stop the engine and remove the key

KEEP RIDERS OFF TRACTOR

Do not allow riders on the Tractor.

Riders on Tractor are subject to injury such as being stuck by foreign objects and being thrown off of the Tractor



HANDLE FUEL SAFELY-AVOID FIRES

Handle fuel with care; it is highly flammable. Do not refuel the Tractor while smoking or near open flame or sparks.

Always stop engine before refueling Tractors.

Always keep your tractor clean of accumulated grease, and debris. Always clean up spilled fuel.

STAY CLEAR OF ROTATING SHAFTS

Entanglement in rotating shaft can cause serious injury or death.

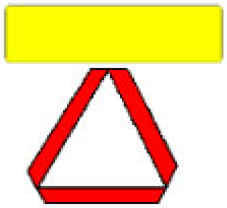
Keep PTO shield in place at all times.

Wear close fitting clothing. Stop the engine and be sure PTO drive is stopped before making adjustments, connections, or cleaning out PTO driven equipment.

ALWAYS USE SAFETY LIGHTS AND DEVICES

Use of hazard warning lights and turn signals are recommended when towing equipment on public roads unless prohibited by state or local regulations.

Use slow moving vehicle (SMV) sign when driving on public road during both day & night time, unless prohibited by law



PRACTICE SAFE MAINTENANCE

Understand service procedures before doing work. Keep the surrounding area of the Tractor clean and dry. Do not attempt to service the Tractor when it is in motion. Keep body and clothing away from rotating shafts. Always lower equipment to the ground. Stop the engine. Remove the key. Let the tractor cool before any repair work is done on it. Securely support any Tractor elements that must be raised for service work.

Keep all parts in good condition and properly installed. Replace worn or broken parts. Replace damage/missing decals. Remove any buildup of grease or oil from the Tractor.

Disconnect the battery ground cable (-) before making adjustments on electrical systems or welding on the Tractor.

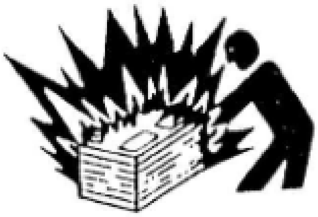
AVOID HIGH-PRESSURE FLUIDS

Escaping fluid under pressure can penetrate the skin causing serious injury. Keep hands and body away from pinholes and nozzles, which eject fluids under high pressure. If ANY fluid is injected into the skin. Consult your doctor immediately.

PREVENT BATTERY EXPLOSIONS

Keep sparks, lighted matches, and open flame away from the top of the battery. Battery gas can explode.

Never check battery charge level by placing a metal object across the poles.



PREVENT ACID BURNS

Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, cause holes in clothing and cause blindness if found entry into eyes.

For adequate safety always;

1.Fill batteries in a well-ventilated area.

2.Wear eye protection and acid proof hand gloves

3. Avoid breathing direct fumes when electrolyte is added.

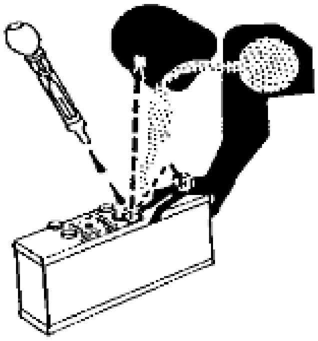
4. Do not add water to electrolyte as it may splash off causing severe burns.

If you spill acid on yourself;

1.Flush your skin with water.

2.Flush your eyes with water for 10-15 minutes.

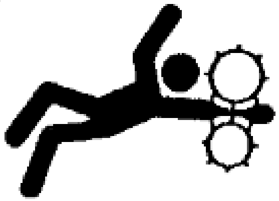
Get medical attention immediately.



SERVICE TRACTOR SAFELY

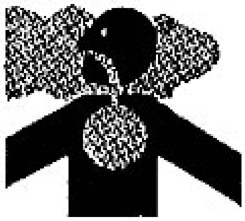
Do not wear a necktie, scarf or loose clothing when you work near moving parts. If these items were to get caught, severe injury could result.

Remove rings and other jeweler to prevent electrical shorts and entanglement in moving parts.



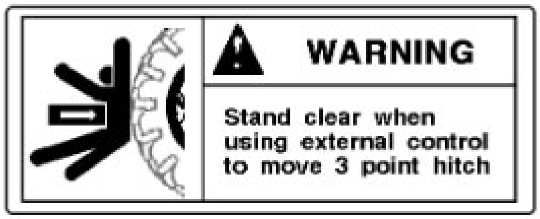
WORK IN VENTILATED AREA

Do not start the Tractor in an enclosed building unless the doors & windows are open for proper ventilation, as tractor fumes can cause sickness or death. If it is necessary to run an engine in an enclosed area remove the exhaust fumes by connecting an exhaust pipe extension which vents the fumes outside the enclosed area.



Using external control

Stand well clear of the rear linkage and implements when using the hitch remote switches or injury can result from moving parts.


WARNING
Stand clear when using external control to move 3 point hitch

TRACTOR RUNAWAY

1 .The Tractor can start even if the transmission is in the engaged position causing the Tractor to runaway and cause serious injury to the people standing nearby the tractor.

2. For additional safety keep the pull to stop knob (were fitted) (fuel shut off control) in fully pulled out position. Transmission in neutral position Foot brake engaged and PTO lever in disengaged position while attending to the Safety Starter Switch or any other work on Tractor.

SAFETY STARTER SWITCH

1. Clutch operated safety switch is provided on all Tractors which allow the starting system to become operational only when the Clutch pedal is fully pressed.
2. Do not By-pass this safety starter switch or work on it. Only Authorized Dealers are recommended to work on safety starter switch.
3. On some models Safety Starter switch is provided on transmission High-low shifter lever and in PTO shifter lever. The tractor can be started only if High-low shifter lever is in neutral position.

Caution

Safety Starter Switch is to be replaced after every 2000 hours/4 years, whichever is earlier

SAFETY DECALS

The following safety decals ARE INSTALLED ON THE MACHINE.

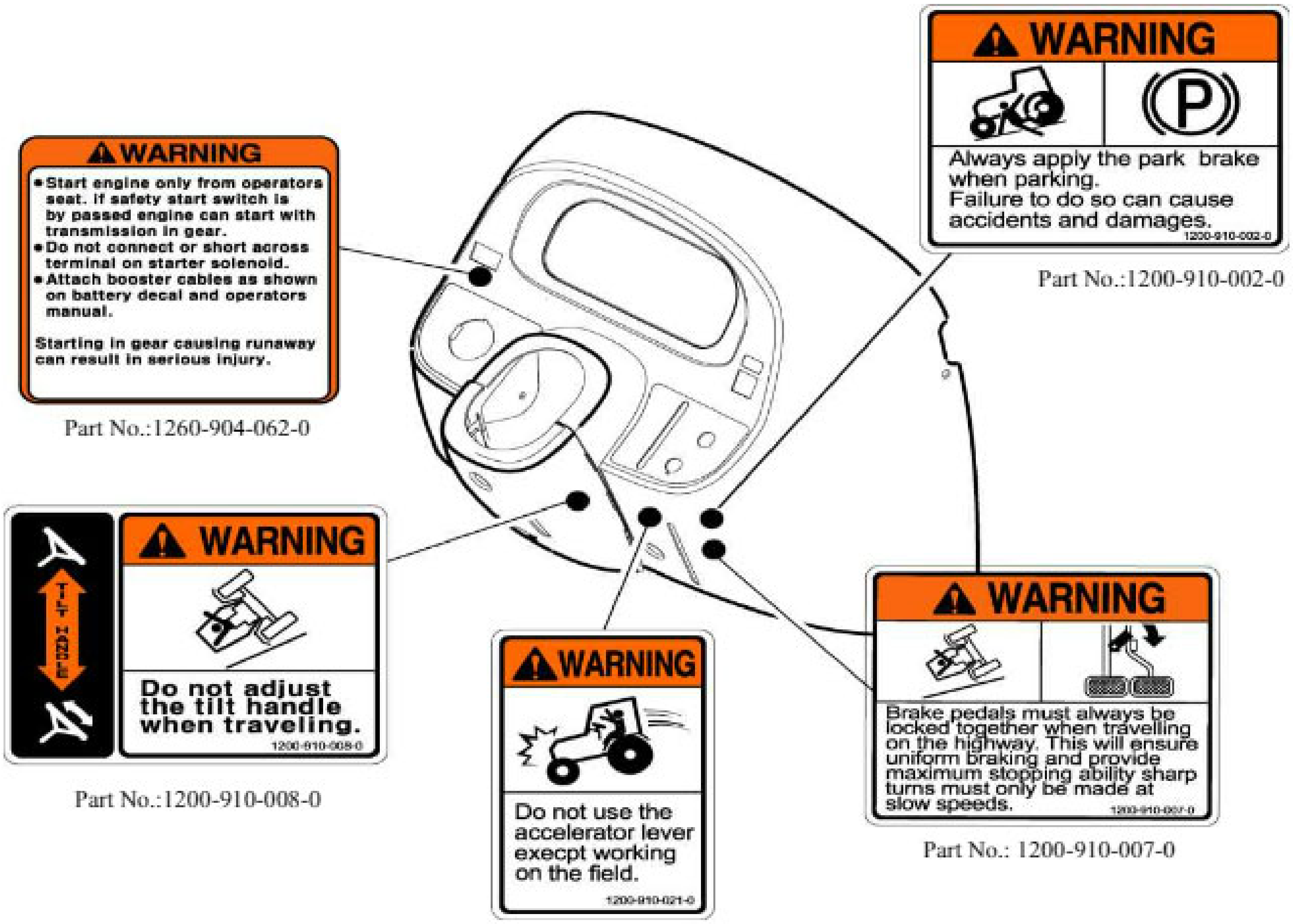
If a decal become damaged, illegible or is on the machine, replace it. The decal part number is listed in the parts lists (Refer to Fig 903 in the parts catalogue)

GENERAL SAFETY INFORMATION

IMPORTANT: This **"General safety Information"** should be kept with the machine at all times as reference data.

⚠	This symbol means **ATTENTION! YOUR SAFETY IS INVOLVED**. The message that follows the symbol contains important information about safety. Follow recommended precautions and safe operating practice.

DECALS ON THE DASH COVER



WARNING

Always apply the park brake when parking.
Failure to do so can cause accidents and damages.

Part No.:1200-910-002-0

WARNING

- Start engine only from operators seat. If safety start switch is by passed engine can start with transmission in gear.
- Do not connect or short across terminal on starter solenoid.
- Attach booster cables as shown on battery decal and operators manual.

Starting in gear causing runaway can result in serious injury.

Part No.:1260-904-062-0

WARNING

Do not adjust the tilt handle when traveling.

Part No.:1200-910-008-0

WARNING

Brake pedals must always be locked together when travelling on the highway. This will ensure uniform braking and provide maximum stopping ability sharp turns must only be made at slow speeds.

Part No.: 1200-910-007-0

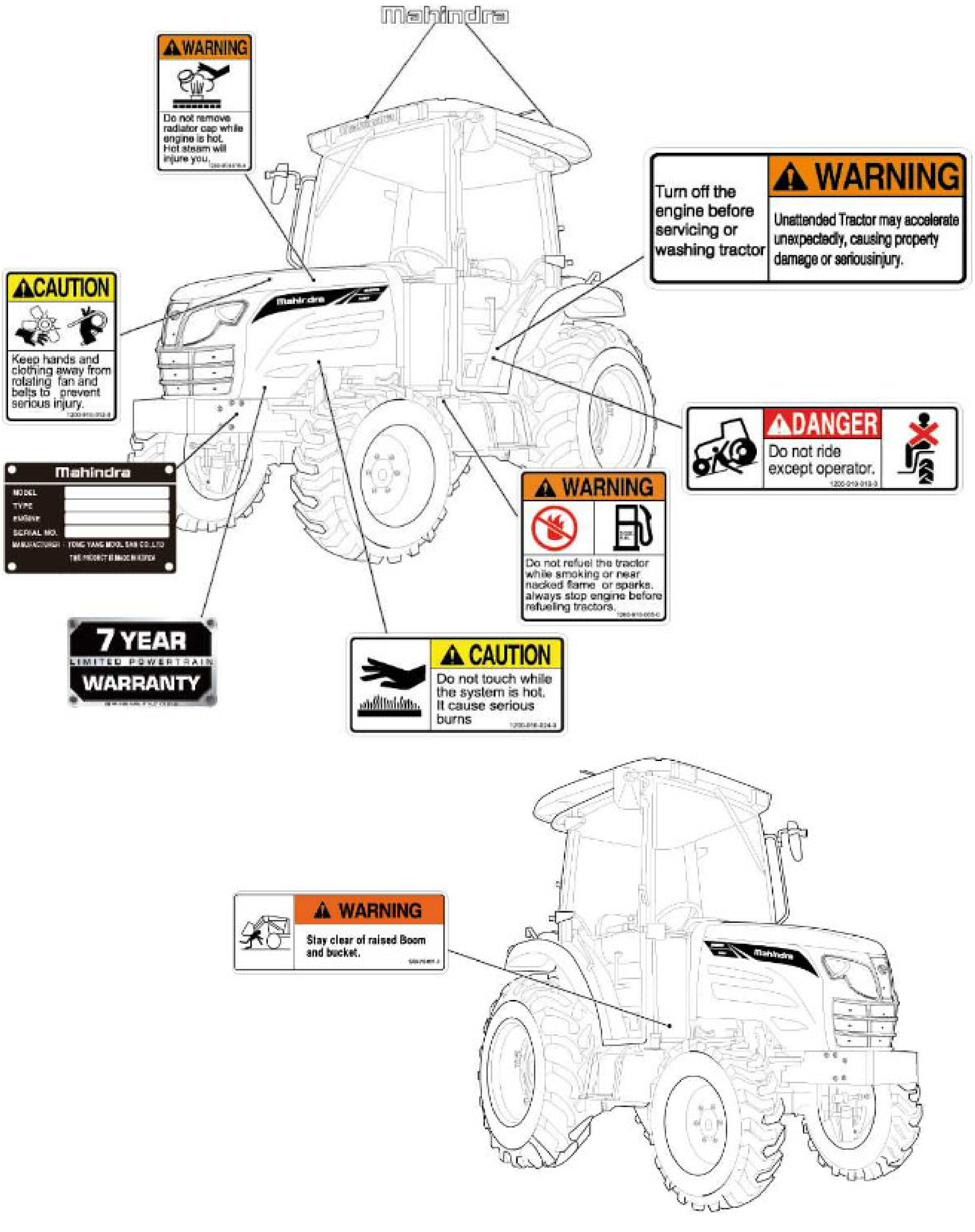
WARNING

Do not use the accelerator lever execpt working on the field.

Part No.:1200-910-021-0

Fig.1-1

DECALS ON THE CHASSIS



Do not remove radiator cap while engine is hot. Hot steam will injure you.

Keep hands and clothing away from rotating fan and belts to prevent serious injury.

Turn off the engine before servicing or washing tractor

Unattended Tractor may accelerate unexpectedly, causing property damage or seriousinjury.

Do not ride except operator.

Do not refuel the tractor while smoking or near nacked flame or sparks. always stop engine before refueling tractors.

Do not touch while the system is hot. It cause serious burns

Stay clear of raised Boom and bucket.

Fig.1-2

DECALS ON THE CABIN

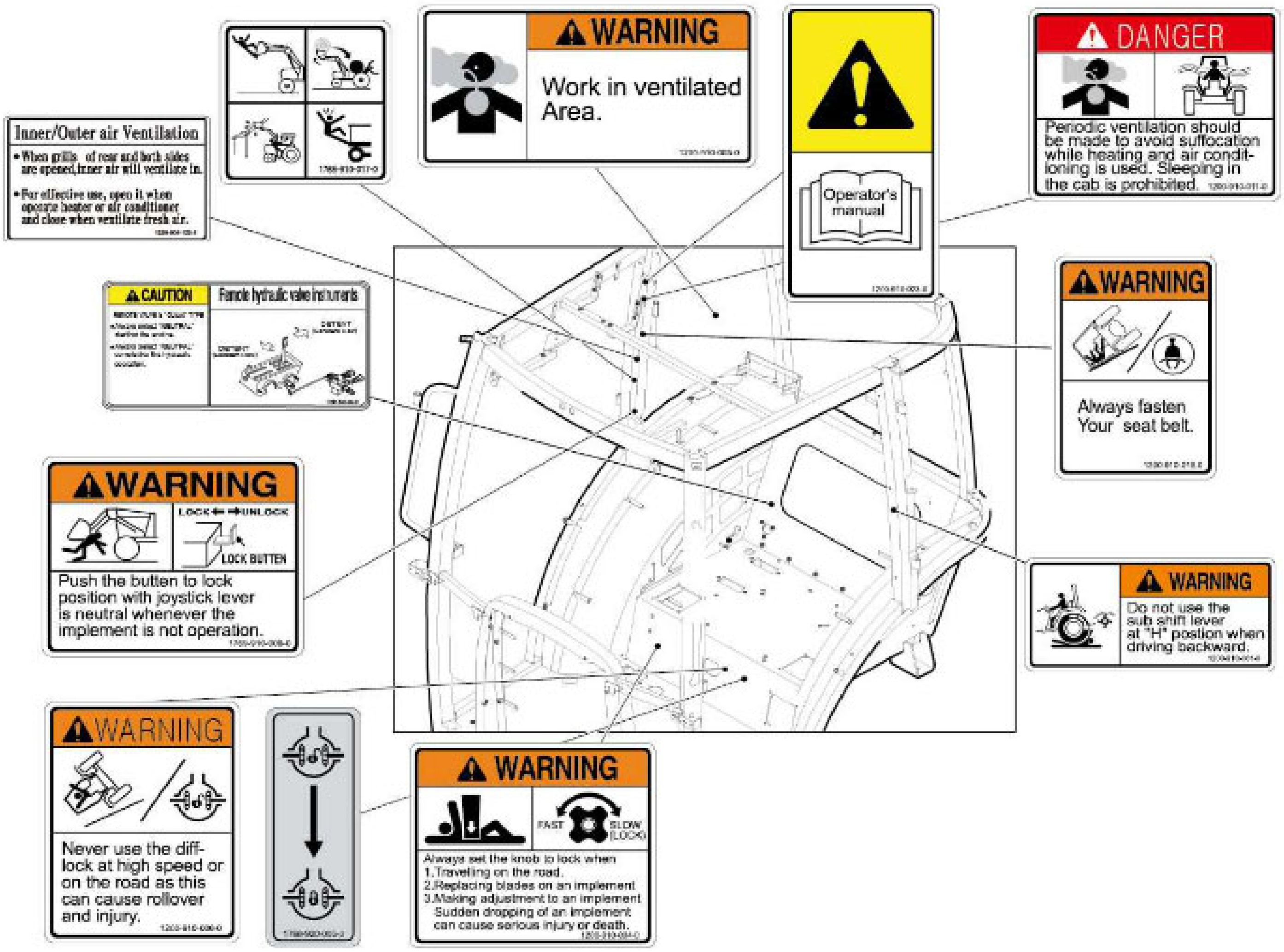
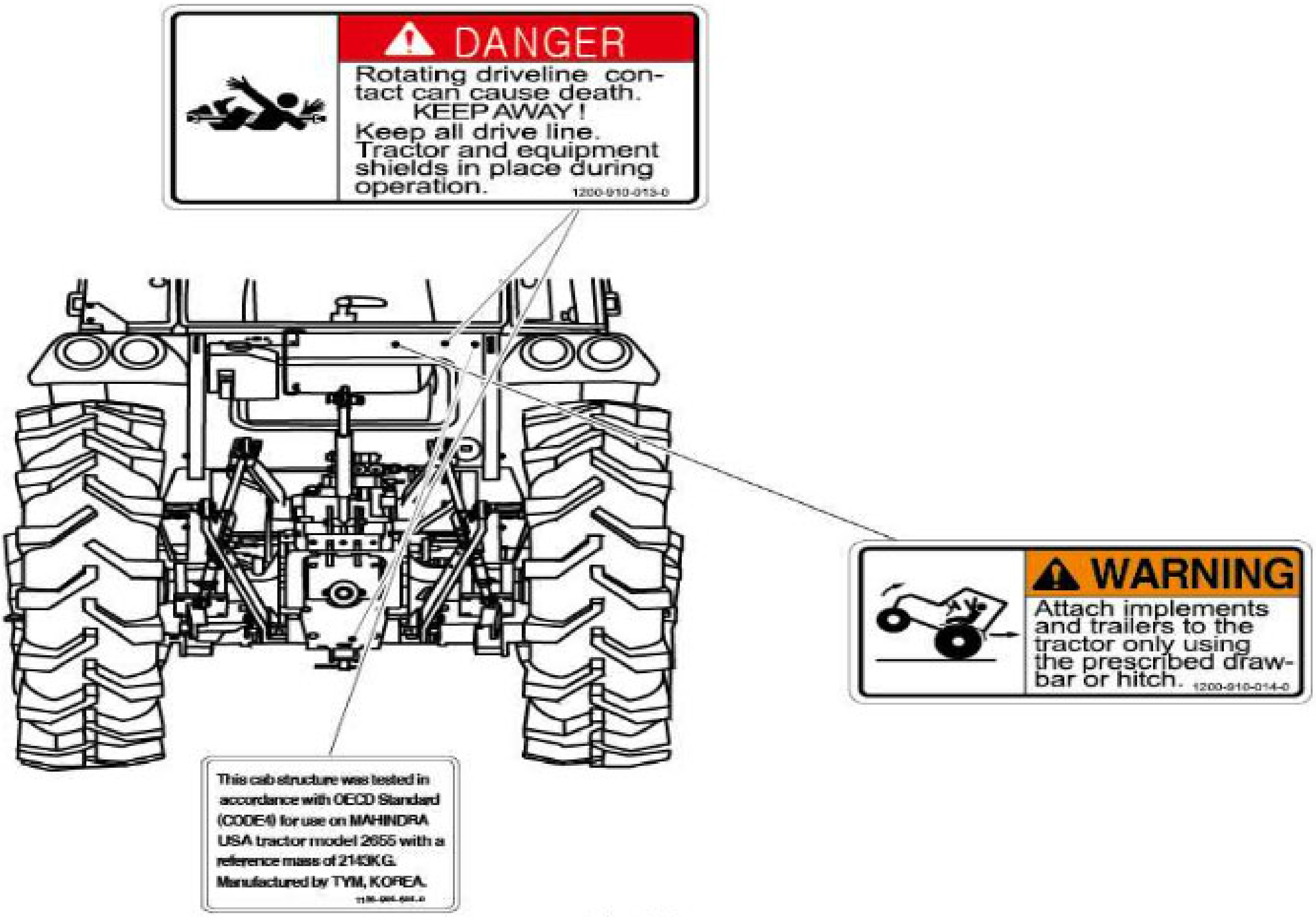

Inner/Outer air Ventilation
• When grills of rear and both sides are opened,Inner air will ventilate in.
• For effective use, open it when operate heater or air conditioner and close when ventilate fresh air.
WARNING
Work in ventilated Area.
Operator's manual
DANGER
Periodic ventilation should be made to avoid suffocation while heating and air conditioning is used. Sleeping in the cab is prohibited.
CAUTION
Remote hydraulic valve instruments
DETENT
WARNING
Always fasten Your seat belt.
WARNING
LOCK UNLOCK
LOCK BUTTEN
Push the butten to lock position with joystick lever is neutral whenever the implement is not operation.
WARNING
Do not use the sub shift lever at "H" postion when driving backward.
WARNING
Never use the diff-lock at high speed or on the road as this can cause rollover and injury.
WARNING
FAST
SLOW (LOCK)
Always set the knob to lock when
1.Travelling on the road.
2.Replacing blades on an implement
3.Making adjustment to an implement
Sudden dropping of an implement can cause serious injury or death.

Fig.1-3

DECALS ON THE CABIN



DANGER

Rotating driveline contact can cause death.
KEEP AWAY !
Keep all drive line.
Tractor and equipment shields in place during operation.
1200-910-013-0

WARNING

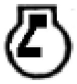
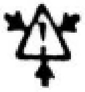
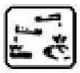
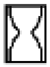
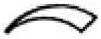
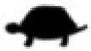
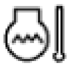
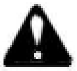
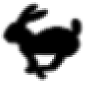
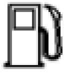
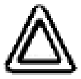
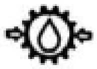
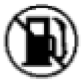
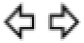
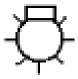
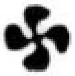
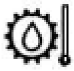
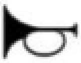
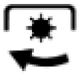
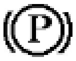
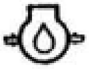
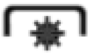
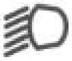
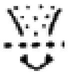
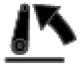
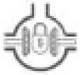
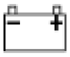
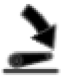
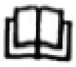
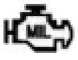
Attach implements and trailers to the tractor only using the prescribed drawbar or hitch.
1200-910-014-0

This cab structure was tested in accordance with OECD Standard (CODE4) for use on MAHINDRA USA tractor model 2655 with a reference mass of 2143KG.
Manufactured by TYM, KOREA.
[illegible]

Fig.1-4

UNIVERSAL SYMBOLS

Some of the universal symbols have been shown below with an indication of their meaning

 **Engine speed rev/minX100)**	 **Pressured- open slowly**	 **Corrosive substance**
 **Hours, recorded**	 **Continuous variable**	 **"Tortoise" Slow or minimum Setting**
 **Engine coolant temperature**	 **Warning**	 **"Hare" fast or maximum setting**
 **Fuel level**	 **Hazard warning**	 **Transmission oil pressure**
 **Engine Stop control**	**N** **Neutral**	 **Turn signal**
 **Lights**	 **Fan**	 **Transmission oil temperature**
 **Horn**	 **Power take off engaged**	 **Parking brake**
 **Engine oil pressure**	 **Power take off disengaged**	 **Work lamps**
 **Air filter**	 **Lift arm/raise**	 **Differential lock**
 **Battery charge**	 **Lift arm/lower**	 **See operator's manual**
 **Mainfunction indicator lamp**	CHK ENG **Check engine indicator**	

SECTION 1. TRACTOR TYPES AND PUNCHED IDENTIFICATION MARKS

The engine number is stamped on the left hand side of the engine block.

The chassis number is shown on the right hand side of the tractor as shown in the drawing.

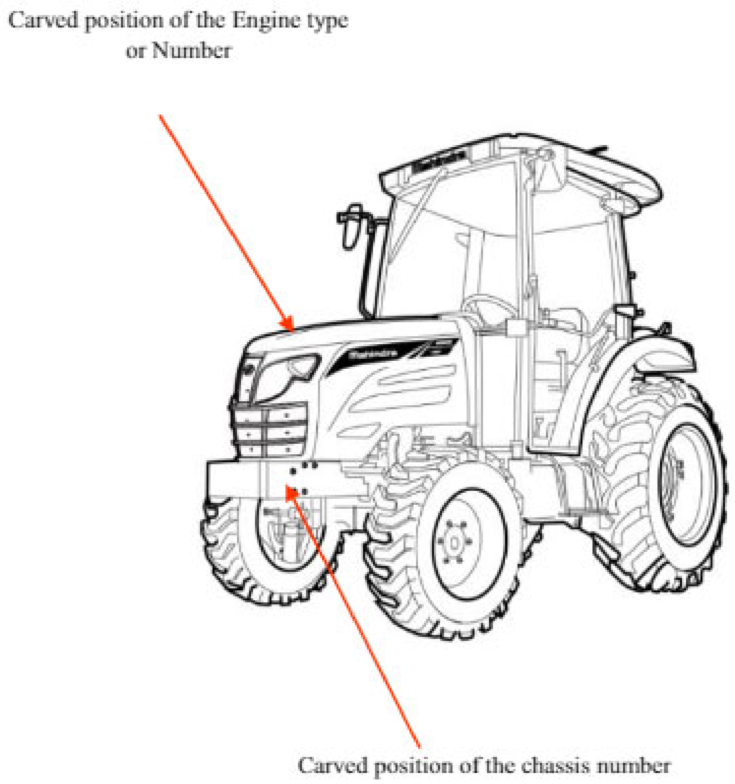

Carved position of the Engine type or Number
Carved position of the chassis number

Illustration A

Fig.1-6

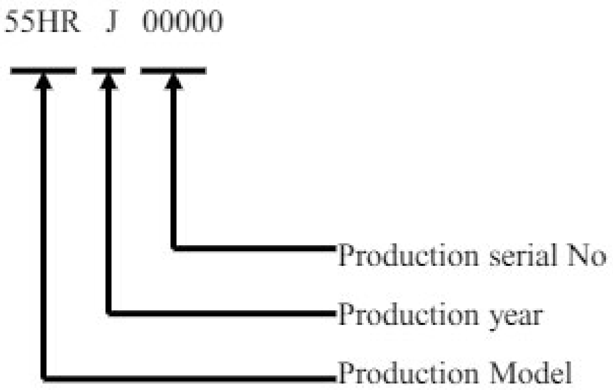
1. MODEL NAME PLATE

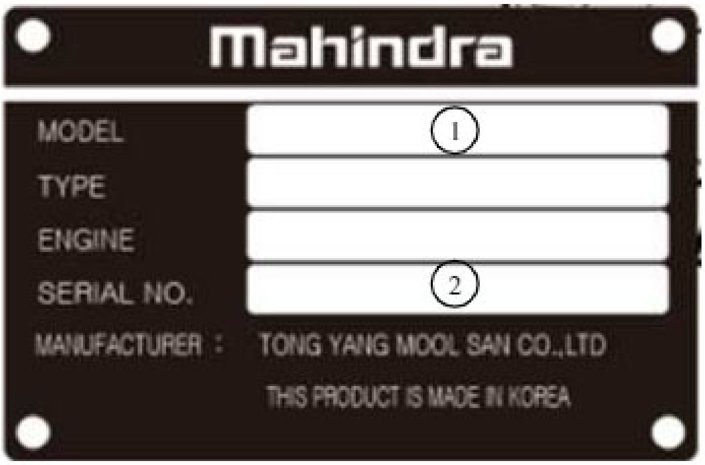
The plate indicates the model and type of the tractor.

① Model name

② Production I.D No.

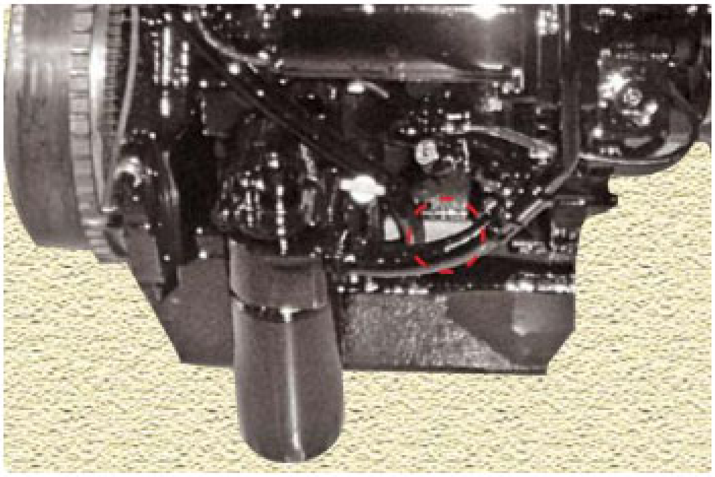
The production I.D reference number is as shown below




Mahindra
MODEL
①
TYPE
ENGINE
SERIAL NO.
②
MANUFACTURER : TONG YANG MOOL SAN CO.,LTD
THIS PRODUCT IS MADE IN KOREA

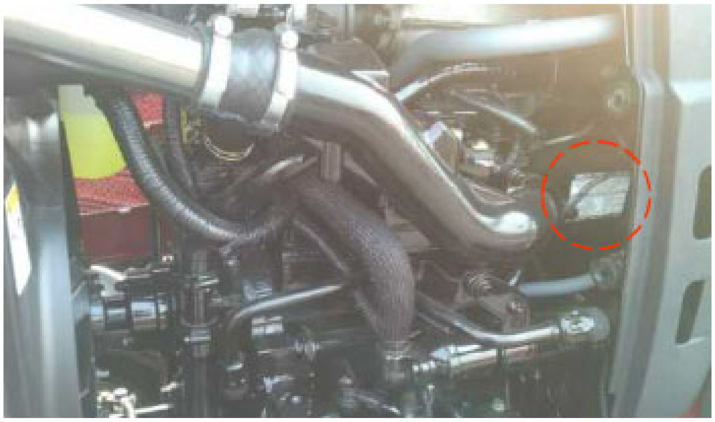
2. Engine Model Identification and serial number location.

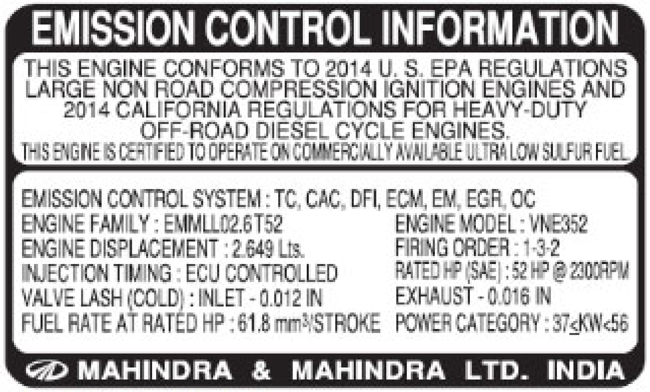
1) Engine Serial No. location



The Engine Serial number is stamped below the gear pump of the engine right hand.

2) Engine EPA decal





EMISSION CONTROL INFORMATION

THIS ENGINE CONFORMS TO 2014 U. S. EPA REGULATIONS
LARGE NON ROAD COMPRESSION IGNITION ENGINES AND
2014 CALIFORNIA REGULATIONS FOR HEAVY-DUTY
OFF-ROAD DIESEL CYCLE ENGINES.
THIS ENGINE IS CERTIFIED TO OPERATE ON COMMERCIALLY AVAILABLE ULTRA LOW SULFUR FUEL.

EMISSION CONTROL SYSTEM : TC, CAC, DFI, ECM, EM, EGR, OC
ENGINE FAMILY : EMMLL02.6T52
ENGINE MODEL : VNE352
ENGINE DISPLACEMENT : 2.649 Lts.
FIRING ORDER : 1-3-2
INJECTION TIMING : ECU CONTROLLED
RATED HP (SAE) : 52 HP @ 2300RPM
VALVE LASH (COLD) : INLET - 0.012 IN
EXHAUST - 0.016 IN
FUEL RATE AT RATED HP : 61.8 mm^3/STROKE
POWER CATEGORY : $37 \leq KW < 56$

MAHINDRA & MAHINDRA LTD. INDIA

2555 EPA & CARB Sticker

This decal represents that this engine is in compliance with the U.S.EPA and California (CARB) exhaust Emission regulation.

The EPA decal is located on the intake manifold of the engine left hand.

3) Assignment standard for engine model code

5530

4) Assignment standard for engine serial no.

55 TYM 000

SPECIFICATIONS

Model: 2655 HST

ENGINE

Four strokes, Indirect injection, water-cooled Diesel Engine.

Model : VNEF4352
No. of cylinders : 3
Displacement : 161.5 cu-in (2,648 cc)
Bore : 3.78 in (96mm)
Stroke : 4.80 in (122mm)
Compression Ratio : 17.2 : 1
Rated power (PS) : 55/2,300 rpm

(Manufacturing rating)
Rated Speed : 2,300 rpm
High idle rpm : 2,500 ±50 rpm
Low idle rpm : 850 ±50 rpm
Fuel injection pump : Common Rail BOSCH PFR
Cylinder sleeve : Wet Replaceable
Air Cleaner : Dry Filter element, paper element filtering type.
Exhaust Muffler : Horizontal External type
Firing order : 1-3-2
Accelerator : Hand Accelerator

ELECTRICAL STARTING AND LIGHTING

Battery Capacity : 12 Volt 100AH
Starter : Solenoid Engaged. Key Start with interlock, Neutral switch
Alternator : 12V 90A
Instrumentation : Water Temperature Gauge, Taco meter, Hour meter, Electrical fuel level gauge.

Lighting: Head lamps, side indicators, Rear parking brake & indicator light On dash board indicators for battery charging, turn signal, PTO signal, Engine oil pressure, Preheat signal.

EGR System EEGR (Electrical Exhaust Gas Recirculation)

CLUTCH

Type : Damper (HST)

TRANSMISSION

Type : HST
No. of gears : 3 forward, 3 reverse speeds with Selection lever with Differential Lock

STEERING

: Hydraulic power (Power steering)

POWER TAKE OFF

Rear mounted : 6 splines
Diameter : 1⅜ in.(35mm)
Standard PTO : 540

BRAKES

Foot operated, independent with provision of inter lock for simultaneous operation. A foot brake is fitted for parking.

Disc Diameter :Φ183mm(Φ7.2in)
Number of lining :4 each side
Total brake thickness : 21.1㎜(0.83in.)

HYDRAULIC SYSTEM

Independent fully "Live" hydraulic pump. Position controls with isolating & response control

Piston and cylinder Lift : 1336kgf / 1503 kgf (at 24inch behind link end/at lower link top end)

Main : 19.5 cc/rev (44 ℓ/min @ 2300rpm)
Power Steering : 8 cc/rev (18 ℓ/min @ 2300rpm)
3 point linkage : USA - Category 1

► MAIN SPECIFICATIONS

MODEL		2655HST/ HST Cab
Engine	**Maker**	Mahindra
	Model	VNEF4 352
	Type	Water cooled 4 cycle 3 cylinder diesel
	Output (hp/rpm)	55/2300rpm
	Number of Cylinders	3
	Displacement (cc)	2,648
	Bore and Stroke (in/mm)	(3.8in×4.8in) 96mm×122mm
	Compression ratio	17.2:1
	Firing order	1-3-2
	Injection pump	In Direct
	Lubrication type	Forced circulation
	Cooling system	Water cooled, Forced circulation
	Coolant capacity	9ℓ (2.37US gal)
	Air cleaner	Dry Dual Element
	Muffler	Horizontal / side

MODEL		2655HST/ HST Cab
Engine	**Fuel**	Diesel
	Fuel Tank capacity	60ℓ(15.85 US gal)
Electrical	**Battery**	12V 100AH
	Starting system	Starter motor with pre-heater
	Starter Capacity	2.2kW
Drive Train	**Alternator**	12V 90A
	Transmission	HST/3 Ranges
	MFWD(4WD)	Standard
	Differential lock	Bevel gears with diff-lock
	Brakes	Wet disc, mechanical
	Steering	hydraulic

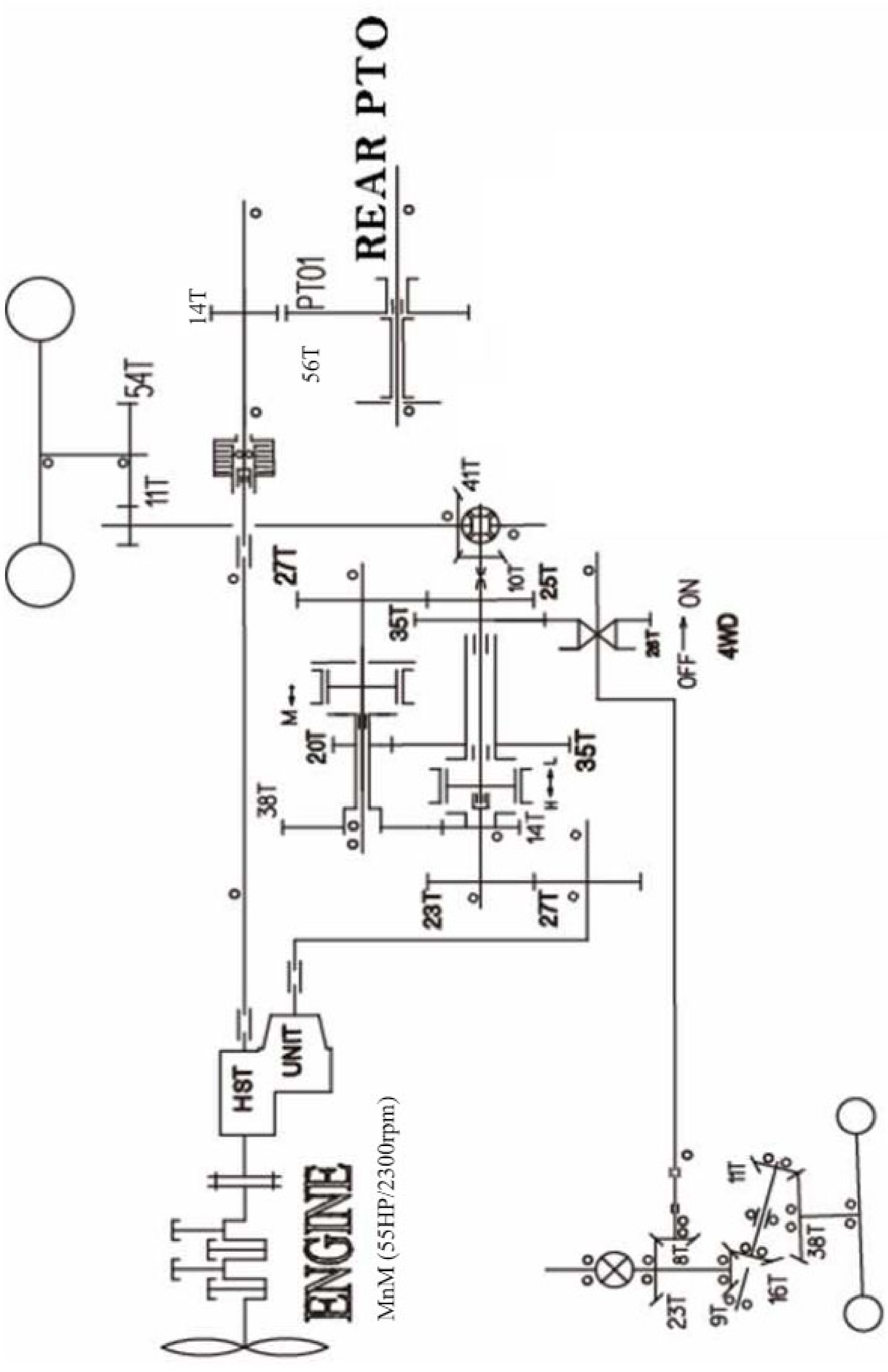
MODEL			2655HST/ HST Cab	
Clutch	PTO		Multiple wet disk	
Dimensions	Overall length (inch/ mm)		135.4(3,440)	
	Overall width inch/ mm)		63.6(1,615)	
	Overall Height inch/ mm)		98.0(2,490)	
	Wheel base (inch/ mm) (Distance between shafts)		74.0(1,880)	
	Min. Ground Clearance inch/ mm)		14.8(375)	
	TYPE	DIVISION	TYRE	Tread
	AG	FRONT	9.5x16 6PR TL Hi Trac Lug	52 inch
		REAR	14.9x24 6PR TL Hi Trac Lug	52.5 inch
	IND	FRONT	12x16.5 6PR TL Trac Loader	56 inch
		REAR	16.9x24 8PR TL Ind Tractor	53 inch
	Axle type	Front	Center pin	
		Rear	Central axle	

Implement	Operation	Hydraulic
	Mounting method	3-Point hitch
	Drawing method	Extendable Drawbar
	3-Point hitch category	Category 1
	Hydraulic-control	Position

Traveling Speed : Km/hour (mile/hour)		
MODEL	2655HST/ HST Cab	
Range shift	Forward	Reverse
L (km/h)	0 ~ 5.84 (3.63)	0 ~ 5.84 (3.63)
M (km/h)	0 ~ 11.0 (6.83)	0 ~ 11.0 (6.83)
H (km/h)	0 ~ 25.2 (15.66)	0 ~ 25.2 (15.66)

* The specifications are subject to change for improvement without notice.

SECTION 3. GEAR TRAIN DIAGRAMS



* CCW : Rotation that is viewed from the flywheel

Fig.1-7 Gear Train Diagram

SECTION 4. PRECAUTION FOR TRACTOR OPERATION

1. INSTRUMENTS

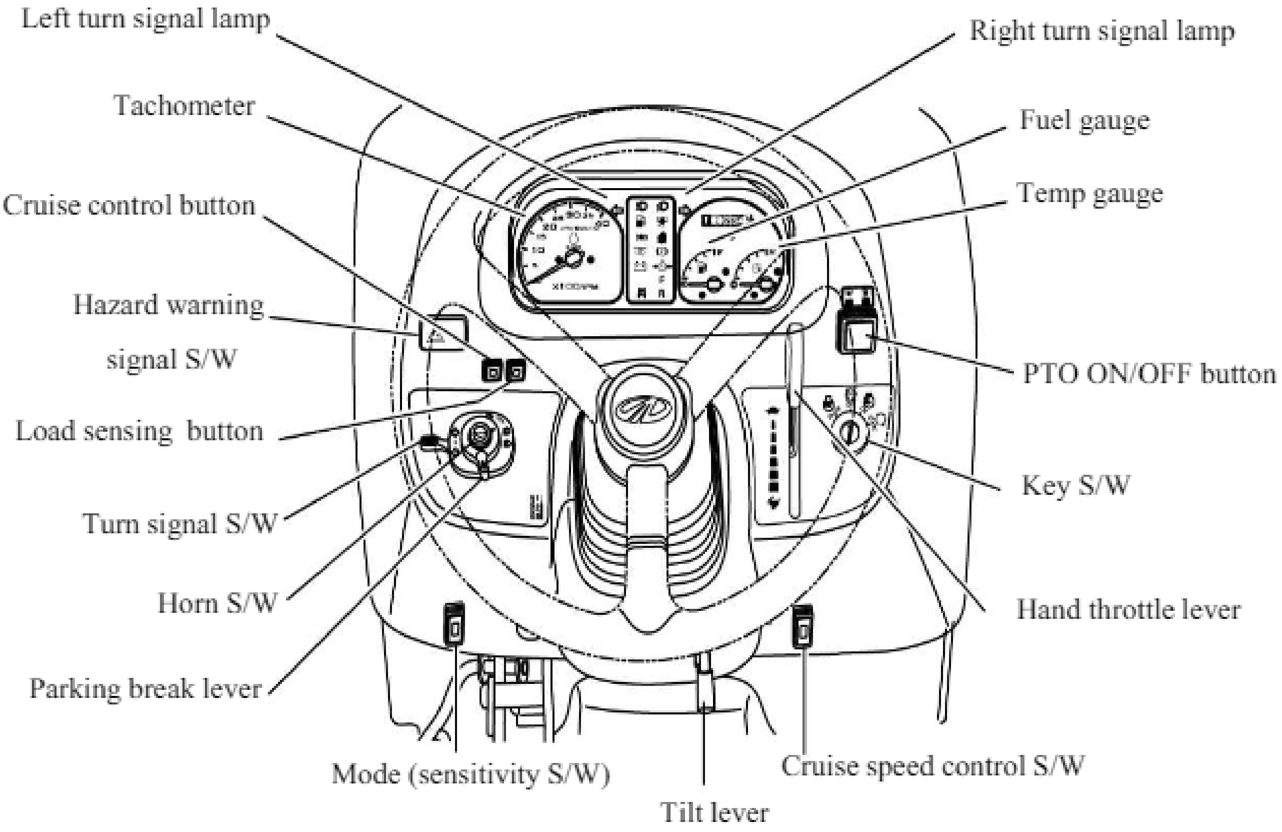


Fig.1-8 Instruments

Note:

- Oil pressure warning light and charge light on the monitor array will light when the main switch is turned from OFF to ON.
- All lights on the panel go out automatically when the engine is started and its speed is increased to a specific level.
- Do not panic if some lights on the monitor light array do not go out while the engine is at idle speed just after its starting. They will go out automatically when the engine speed reaches as a specific level.

1) MONITOR LIGHT ARRAY

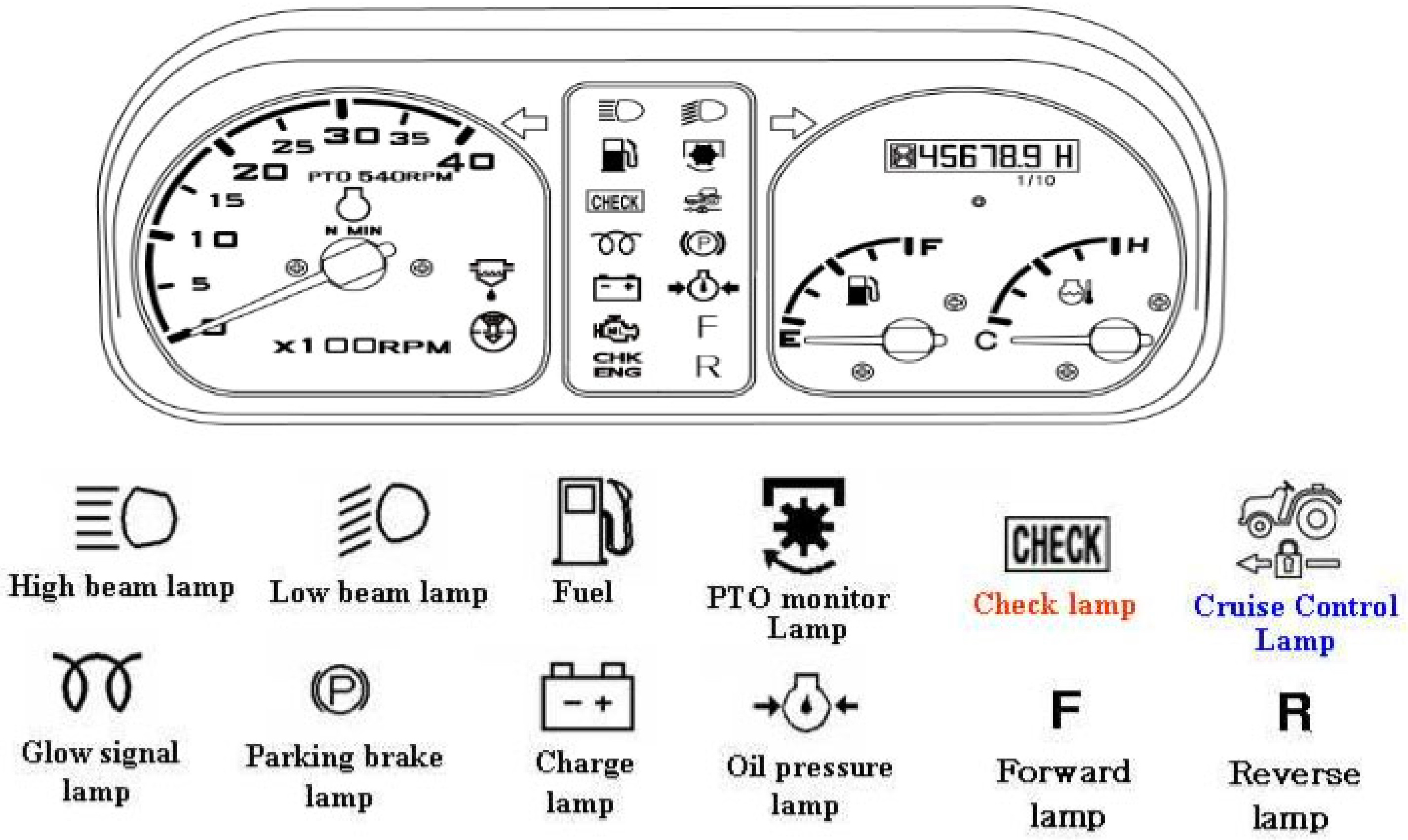


Fig.1-9

2) CABIN Control

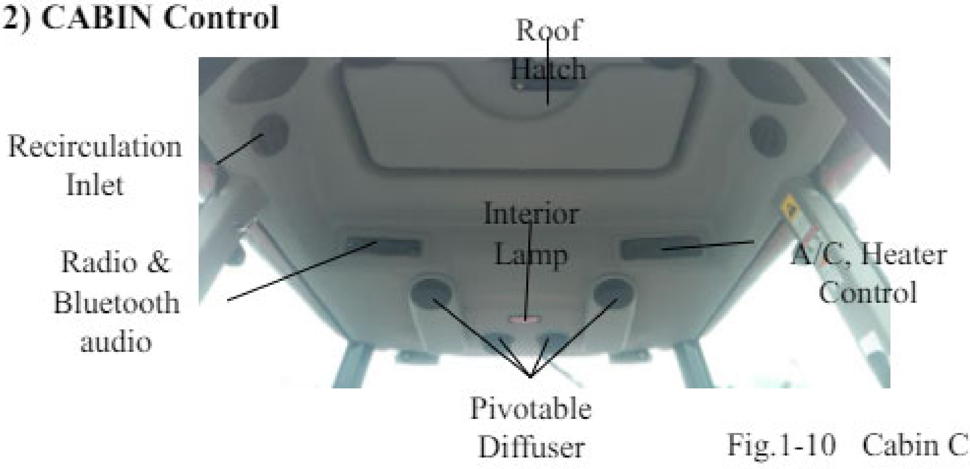


Fig.1-10 Cabin Control

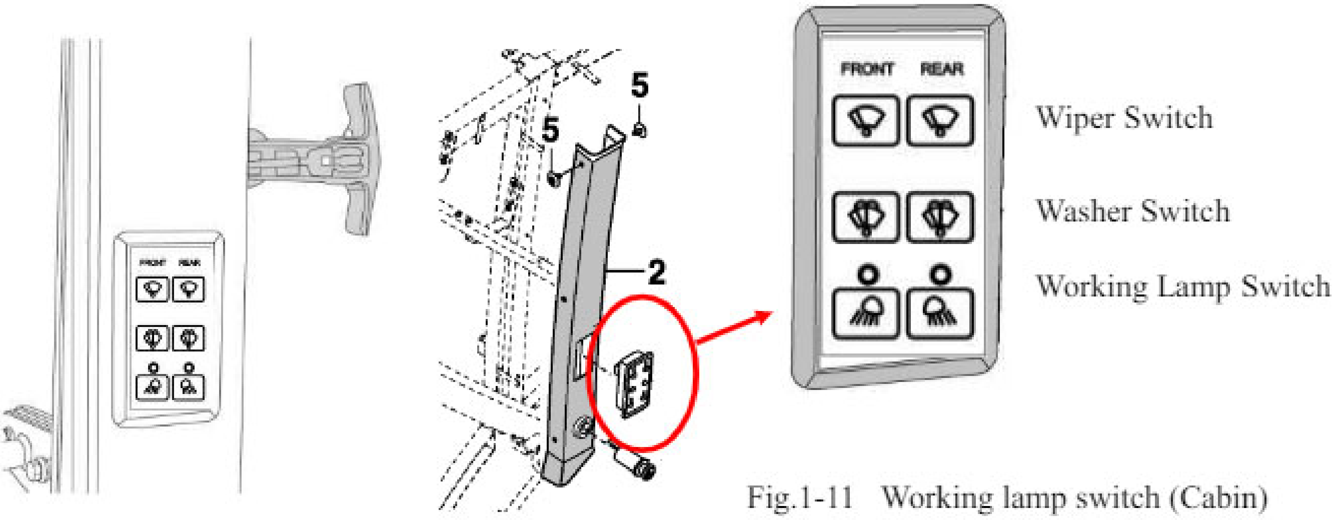


Fig.1-11 Working lamp switch (Cabin)

VENTILATION

The ventilation unit is housed in the cab ceiling.

To switch it on and adjust it, turn the electrical fan switch to the desired speed.

The cab becomes slightly pressurized when the ventilation system is in operation, so that fresh air can enter only by way of the filter installed in the rear section of the cab roof.

The fan switch can be operated only after the ignition key is inserted.

The air flow can be regulated and directed by suitable positioning of the air diffusers.

Air can be taken in fresh from outside or re-circulated from within the cab by way of the relative side inlets

Re-circulation inlets fully closed: air is taken in entirely from outside the cab through the rear grille and filtered through a paper element positioned behind the grille.

N.B-it is very important that the air diffusers be never closed completely so as to allow for a steady air flow.

To obtain greater pressurization inside the cab, it is necessary to take air from the outside, therefore the inside air re-circulating grille should be fully closed.

2. CONTROLS

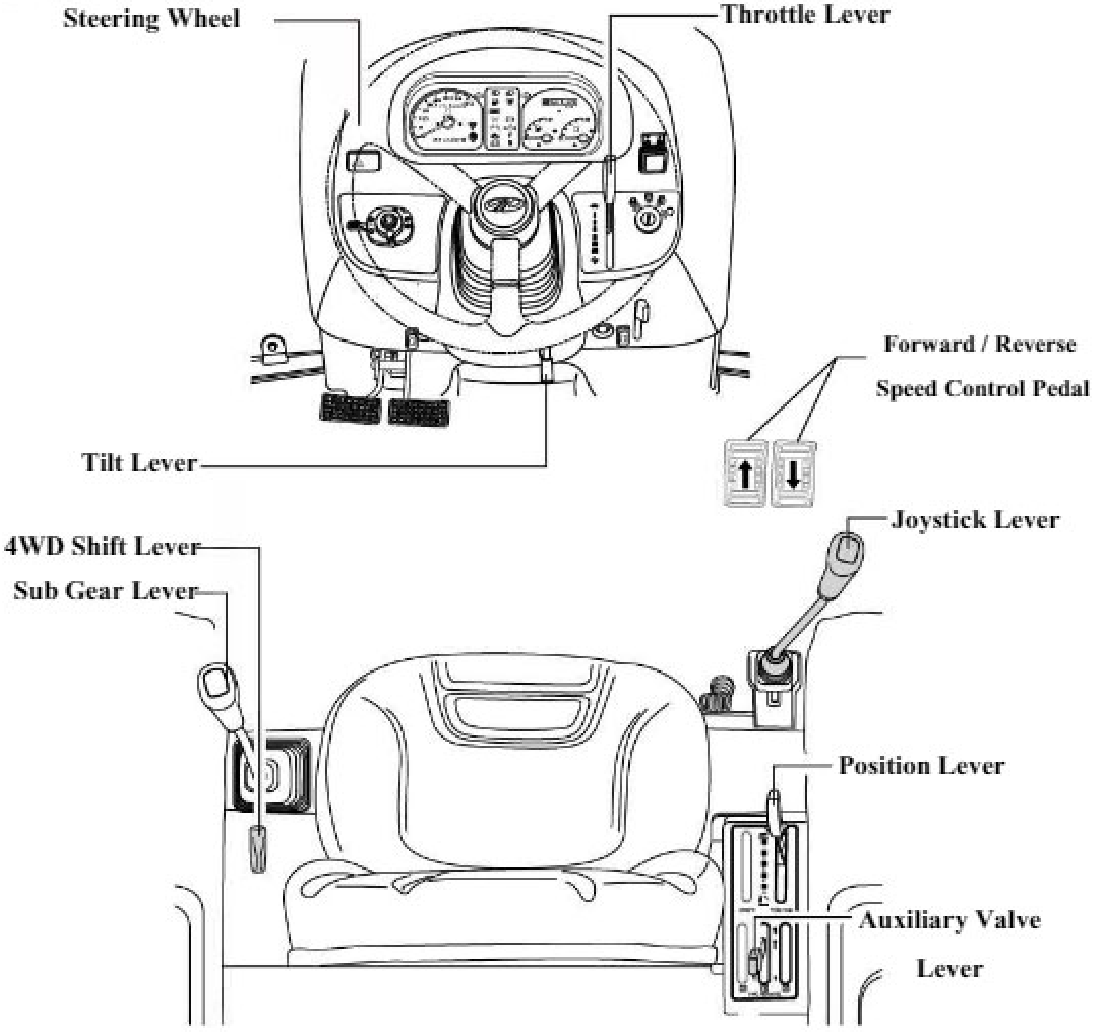


Fig.1-12 Controls

3. FILLING DIAGRAM & CAPACITY TABLE

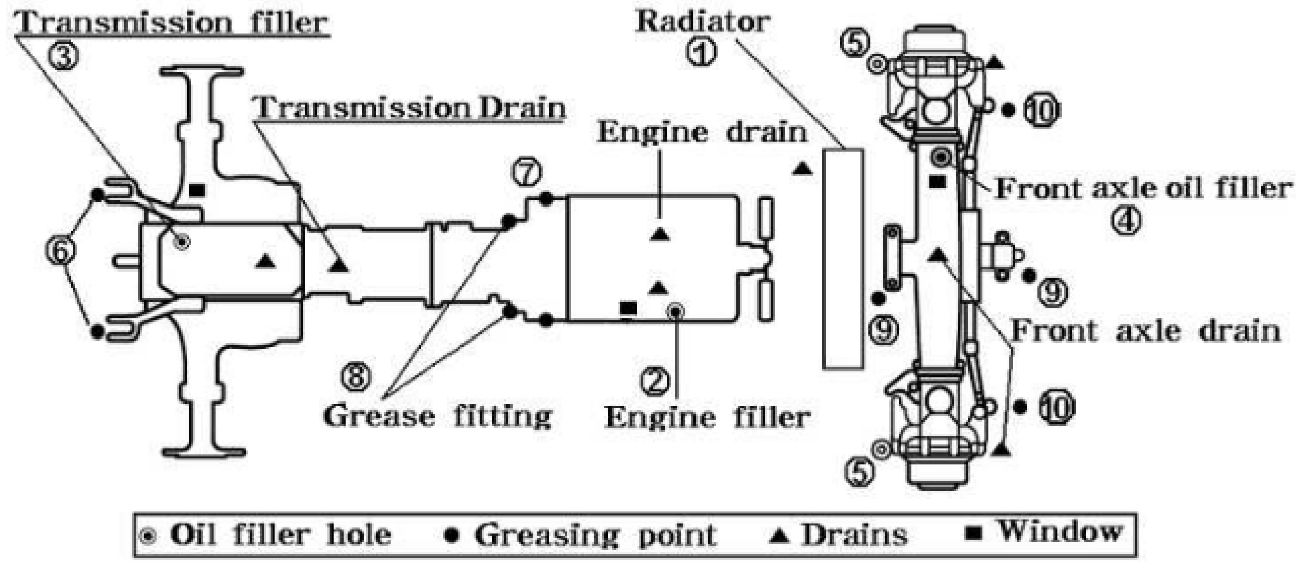
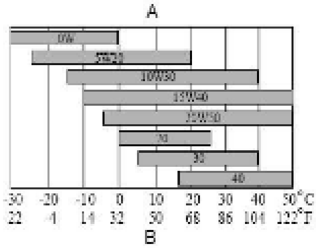


TABLE 1-7

No.	Filling point	Fillings	Quantity Liter (gal.)
	MODEL		2655 HST
1	RADIATOR	50/50 : Ethylene Glycol/Water (L.L.C) ASTM D4985 / D6210	8.9ℓ (2.35 US gal)
2	ENGINE	API : Over CJ4 grade , SAE 15W40 **Recommended SAE viscosity grades**  A: Viscosity B: Temperature	8.5ℓ (2.25 US gal)
3	TRANSMISSION CASE	Mahindra UTH (Hydraulic Fluid) (API GL-4 Grades) (MAHINDRA EP GEAR OIL SAE 80W-90)	35ℓ (9.25 US gal)
4	FRONT AXLE		10ℓ (2.64 US gal)
5	FINAL DRIVE CASE(B)		
6	BALL JOINT/Brake Pedal	Grease	As required
7	FUEL TANK	Diesel fuel	60ℓ (15.85 US gal)

Tire

TABLE 1-8

Tire	DIVISION	Type	Trade	MODEL
AG	Front	9.5x16 6PR TL Hi Trac Lug	52 in	2655 HST (If equipped)
	Rear	14.9x24 6PR TL Hi Trac Lug	52.5 in	
IND	Front	12x16.5 6PR TL Trac Loader	56 in	
	Rear	16.9-24 8PR TL Ind Tractor	53 in	

4. MAINTENANCE CHART

○ inspection, replenish, and adjustment

● Replacement △ Cleaning and/or washing

★ Consult your Dealer

☞ ENGINE

Inspection items	Daily	Inspection and servicing intervals Hour of operation (X10 on hour meter)												Intervals after that	Judgment criteria mm(in)
		5	10	15	20	25	30	35	40	45	50	55	60		
Engine oil	○	●									●			Every 500 hours or 12months First change should be done in 50 hours.	Level is between upper and lower limits
Oil filter		●									●				
Change Oil Pre-Separator														Every 1500 hours	
Change PCV Oil Separator Filter Element														Every 1500 hours	
Greasing for Roller Bearing at Front Cover											●			Every 500 hours	
Air cleaner			△		△		△		△		△		●	Clean after every 100hrs.Replace element that has been washed more than 5 times	
Radiator coolant	○													Replace every year. Check daily top up if required	Fill coolant up to radiator throat
Radiator	○													Check daily for damages leakage	
Radiator fin & screen	○				△				△				△		Clean cooling fins and cores
Fuel	○													Everyday and before work	Tank should be full
Fuel filter	○	○	○	△	○	●	△	○	○	△	●	○	△	Every 250hours or 12months	
Fan belt	○													Check daily	About 5(0.20in) deflection pushed with a finger
Electrolyte level	○		○		○		○		○		○		○	Check after every 100hrs.and replenish if necessary	

○ inspection, replenish, and adjustment

● Replacement △ Cleaning and/or washing

★ Consult your Dealer

☞ TRANSMISSION

Inspection items	Daily	Inspection and servicing intervals Hour of operation (X10 on hour meter)												Intervals after that	Judgment criteria mm(in)
		5	10	15	20	25	30	35	40	45	50	55	60		
Transmission oil	○	●					★					●		Every 500 hours or 12months after first 50 hours	Clean hydraulic suction filter at the same time.
Brake pedal free play	○													Check daily	Free Play:30 to 40mm
Brake performance	○													Check daily	Interlocked brakes should work simultaneously
Lever performance	○													Check daily	Every lever should work positively
Steering wheel free play	○													Check daily	About 50mm (1.97) on circumstance
Toe-in							★						★	Check after every 300 hrs	0 to 4 mm (0~0.157 in)
Retightening ball joints of steering system	○						○						○	Check after every 300 hrs	
Wheel tightening bolts and nuts	○													Check daily	All should be tighten Front:116-130(ft-lbs) Rear:268-282(ft-lbs)
Greasing each nipple		○	○	○	○	○	○	○	○	○	○	○	○	Replenish every 50 hrs (Everyday in dusty condition)	
Loose bolts and nuts	○														All should be tighten
Electric wiring	○						○						○	Check every year	All should work properly.

○ inspection, replenish, and adjustment

● Replacement △ Cleaning and/or washing

★ Consult your Dealer

Inspection items	Daily	Inspection and servicing intervals Hour of operation (X10 on hour meter)												Intervals after that	Judgment criteria mm(in)
		5	10	15	20	25	30	35	40	45	50	55	60		
Electric apparatuses														Check every year	All should work properly
Adjusting accelerator pedal and throttle lever							★					★		Check after 300 hours	
Oil leaks in clutch housing							○						○	Check once a year with the lower plug pulled out	
Hydraulic fluid filter		●					★					●		Every 500 hours or 12months after first 50 hours	
HST oil Filter		●					★					●			
4WD front axle housing oil		●		○		○		○		○		●		Check after every 100 hrs. Replace every 500hrs after first 50hrs	Replace if leaking
Rubber pipes		○		○		○		○		○		○		Check after every 100 hrs.	

1) Every terminal should be connected securely

2) Wiring should not interfere with other parts.

3) Fatigued wiring should be replaced.

4) Wiring should be held in each clamp properly.

Chapter 2

Disassembly and reassembly of major components

SECTION 1. GENERAL PRECAUTIONS AND SEPARATION AND REINSTALLATION ---------------------------------- 2-1

1. Before operation -- 2-1
2. Precautions to be followed when installing standardized parts. ------------------------------------ 2-1

SECTION 2. OPERATION CHART FOR DISASSEMBLY AND REASSEMBLY BY MAJOR BLOCKS ------------- 2-4

SECTION 3. SEPARATION OF MAJOR COMPONENTS ---------- 2-5

1. Separation of the front axle and axle support ----------------------------------- 2-5
2. Separation of the engine and front axle support -------------------------------- 2-6
3. Separation of the engine and front transmission -------------------------------- 2-7
4. Separation of the front transmission and Spacer transmission --------------- 2-12
5. Separation of the Spacer transmission and rear trans mission --------------- 2-18
6. Separation of the rear transmission and rear axle housing -------------------- 2-19
7. Separation of the rear transmission and Cylinder case ----------------------- 2-20

Chapter 2. Disassembly and reassembly of major components

SECTION 1. GENERAL PRECAUTIONS FOR SEPARATION AND REINSTALLATION

1.BEFORE OPERATION

1) Always be safety-conscious in selecting clothes to wear and suitable tools to use.

2) Before disassembly, be sure that you familiarize yourself with the assembled condition for subsequence in reassembly.

3) Keep parts and tools in proper order during operations.

4) When servicing electrically charged parts, be sure to disconnect the negative battery terminal.

5) To prevent oil or water leaks, use the liquid gasket as required (TB 1401S).

6) When lifting up only the front or rear part of the tractor, be sure to wedge the grounded wheels.

7) When the tractor is jacked up, be sure to support the entire tractor with something like a stand. Lifting it up with a jack only is dangerously unstable procedure.

8) When replacing parts, use authorized, genuine TYM parts only. TYM assumes no responsibility for accidents, operating problems or damage caused by the use of imitation parts.

Also, the use of unauthorized parts will result in relatively poor machine performance.

2. PRECAUTIONS TO BE FOLLOWED WHEN INSTALLING STANDARDIZED PARTS.

(1) Roller or Ball bearings

1) When a bearing is fitted in by the outer race, use an installer which is an specially designed to push only the outer race and vice versa.

2) The installer must be designed to install the bearing on the shaft in a parallel position.

3) When installing a bearing which appears the same on both sides, install it so that the face which has the identification number faces in a direction for easy visual identification. All the bearings which are to be installed in the transmission case should be placed so that their identification number faces outward.

4) If a shaft or hole where a bearing is to be installed has a stopper, the bearing should be pushed in completely until it is seated against the stopper.

5) Installed bearings should turn smoothly.

(2) Oil seals

1) Oil seals installer should be designed so as not to deform the oil seals.

2) During installation, be careful not to damage the lips, and assure that it is pushed in parallel to the shaft or hole.

3) When oil seals are installed, there should be no turnover of the lips nor dislocation of the springs.

4) When a multi-lip seal is installed, the grooves between lips should be filed with grease, not adhesive.

(3) O-rings

1) O-rings should be coated with grease before installing.

2) Installed O-rings should have no slack or twist.

3) Installed O-rings should maintain proper air tightness.

(4) Snap rings

1) Snap ring installers should be designed so as not to permanently deform the snap rings.

2) Installed snap rings should be seated securely in the groove.

3) Be careful not to overload the snap ring to the extent that it is permanently deformed.

4) How to install the snap ring:

When installing a snap ring, install it as shown in the figure with its round edge side turned toward the part to be retained. This round edge is formed when the snap ring is pressed out.

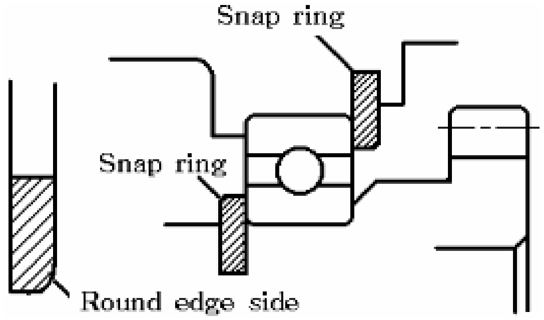


Fig.2-1

(5) Spring (roll) pins

1) Spring pins should be driven in properly as tightly.

2) Spring pins should be installed so that their seams should face the direction from which the load is applied.

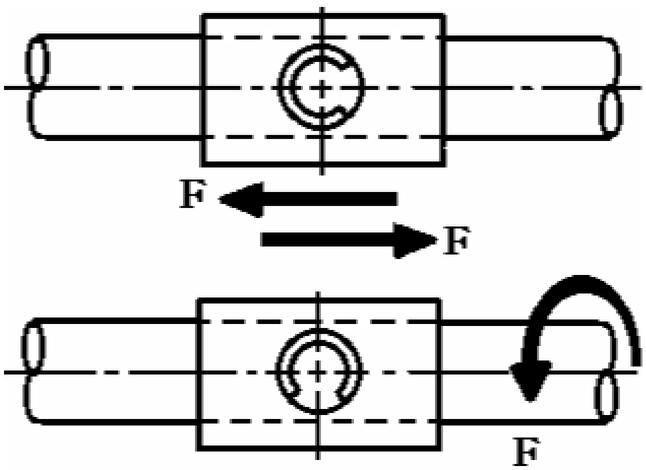


Fig.2-2

3) The roll pins installed in the transmission or other parts where much force is applied should be retained with the wire.

(6) Cotter pins

When installed, cotter pins should be bent securely at the ends as shown in the figure

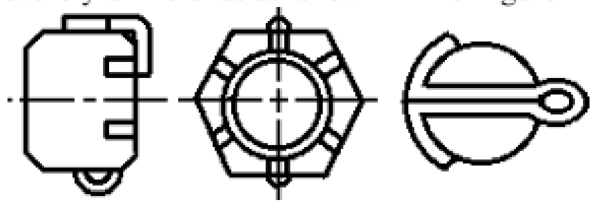


Fig.2-3

(7) Bolts and nuts

1) Special bolts are installed at several locations, so be sure not to interchange them other bolts.

2) Bolts and nuts should be tightened to their specified torque wrench.

3) When locking the bolts or nuts with wire or a lock washer, Be sure to wind the wire paying sufficient attention to its winding direction and bend the lock washer for secure looking.

4) When locking bolts and nuts with an adhesive, apply the adhesive on the thread and tighten securely.

5) Apply an adhesive (THREE BOND TB1104) to parts through which there is any possibility of oil leaks, such as stud bolts and tapped-through parts.

6) Each lock nut must be tightened securely.

7) When tightening bolts and nuts, refer to the tightening torque table.

(8) After installation, each grease fitting should be filled with grease.

1) When installing grease fittings of type B and C, be sure to turn the fitting tips in a direction that will provide easy access for a grease gun.

(9) Other precautions.

1) Be sure not to damage any finished surfaces or parts.

2) Always refrain from forcing installation.

3) Each lever knob should be installed coated with an adhesive(SUPER THREE CEMENT TB1702)

4) Each contact surface should be coated with an adhesive (THREE BOND TB 1215) and tightened evenly with bolts. Adhesive coated surfaces should be installed within 30 minutes after application of the adhesive. The contact surfaces should be flawless and free from foreign matter, and especially from grease before application of the adhesive.

5) Precautions for applying adhesives.

The surface or the thread where and adhesive is to applied should be completely free of chips.

The surface or the thread where an adhesive is to be applied should be completely free of oil-less.

Bolt Tightening Torque (kgf.m)

Spec	4T		7T		9T	
	Coarse	Fine	Coarse	Fine	Coarse	Fine
M3	0.07~0.09	-	-	-	-	-
M5	0.35~0.45	-	0.5~0.7	-	-	-
M6	0.50~0.70	-	1.1~1.4	-	1.25~1.45	-
M8	1.3~1.7	-	2.3~3.0	-	3.0~3.5	-
M10	2.5~3.5	2.0~2.8	4.5~6.0	3.6~4.8	6.5~7.2	5.2~5.76
M12	4.5~6.0	3.6~4.8	8.0~10	6.4~8.0	10.5~12	8.4~9.6
M14	7.0~8.5	5.6~6.8	12~15	9.2~12	17~20	13.6~16.0
M16	11~14	8.8~11.2	17~21	13.6~16.8	20.5~31	16.4~24.8
M18	16~19	12.8~15.2	24~29	19.2~23.2	35~41	28~32.8
M20	22~27	17.6~21.6	33~41	25.4~32.8	50~58	40~46.4

*** In case of nut torque, 80% torque of above table respectively**

Air-conditioner (kgf.m)

R-12 (R-134a)	Pipe Diam.	Without O-ring	With O-ring
7/16-20UNF (-)	1/4”,D6	1-1.5	-
9/16-18UNF (M16xP1.5)	5/6”,D8	2-3	1-2
5/8-18UNF (M18xP1.5)	3/8”,D9.52	2-3	1-2
3/4-16UNF (M20xP1.5)	1/2”, D12.7	3-4	1.5-2.5
7/8-14UNF (M22xP1.5)	5/8”,D15.8	4-5	2-3
11/16-14UNF (-)	3/4”,D18.9	5-6	2.5-3.5
11/14-12UNF (-)	7/8”,D22.2	6-7.5	3-4

Coupling-Hydraulic (Kgf-m)

¼”	2.5
3/8”	5
½”	6
¾”	12
1”	14
1-1/4”	17
1-1/2”	21

Nut-Bearing (kgf.m) (Calking Nut only)

AN02	AN03	AN04	AN05	AN06	AN07	AN08	AN09	AN10	AN11	AN12
M15	M17	M20	M25	M30	M35	M40	M45	M50	M55	M60
2-4	2-4	3-5	3-5	3-5	6-8	6-8	6-8	8-10	8-10	8-10

SECTION 2. OPERATION CHART FOR DISASSEMBLY AND REASSEMBLY BY MAJOR BLOCKS

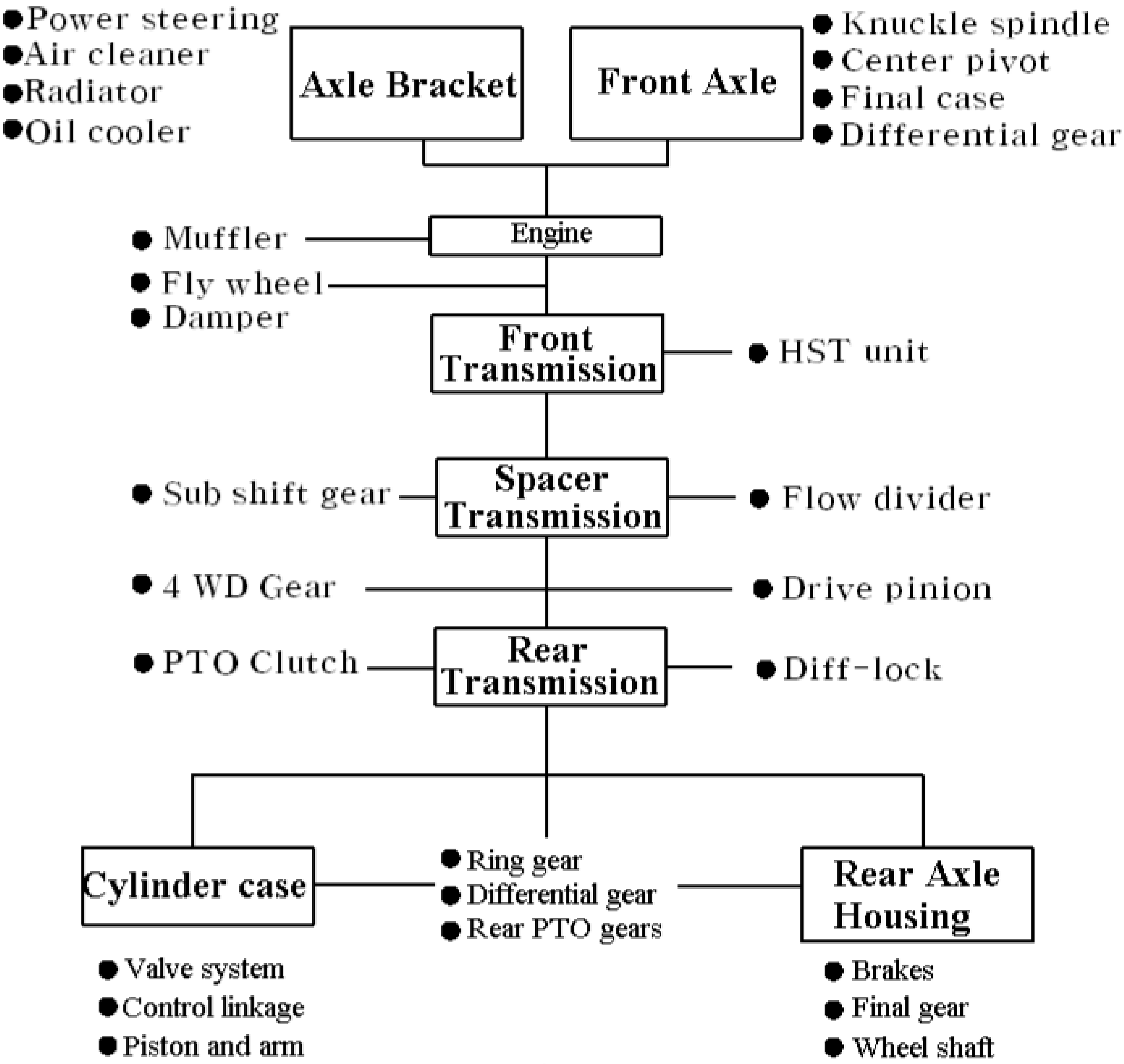


Fig.2-4

SECTION 3. SEPARATION OF MAJOR COMPONENTS

1. SEPARATION OF THE FRONT AXLE ASSEMBLY AND THE AXLE SUPPORT

Parts which can be inspected during this operation

-Final case -Differential gear -Power steering system

(1) Removal

1) Hold the front hitch or the front bracket securely with a crane or stands.

2) Support the front axle support with a jack

3) Remove the couplers (RH & LH) of steering hoses to the power cylinder or remove the couplers in the middle of the hoses.

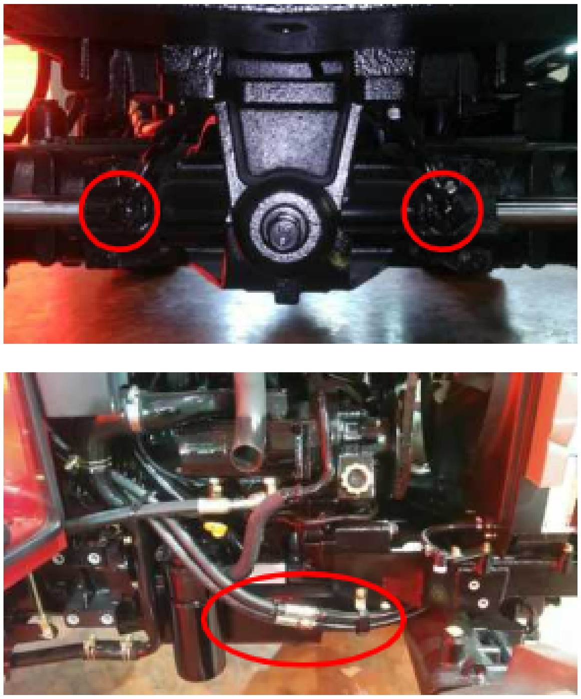


Fig.2-5 Steering Connectors and hoses

4) Remove six bolts connecting the front axle supports with the front axle support

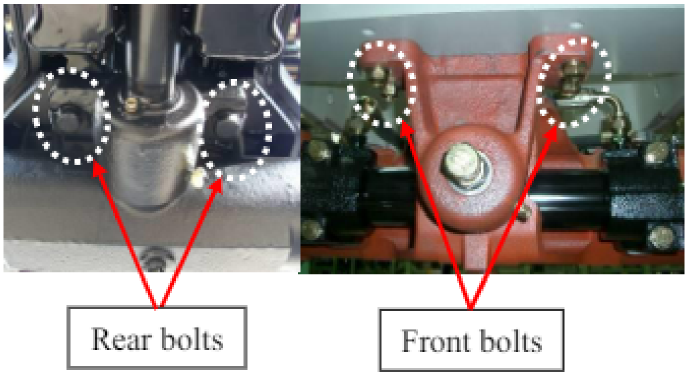


Fig.2-6 Front axle

5) Remove the front axle assembly forward.

Note : When working on the 4WD version, the drive shaft should be removed ahead of time.

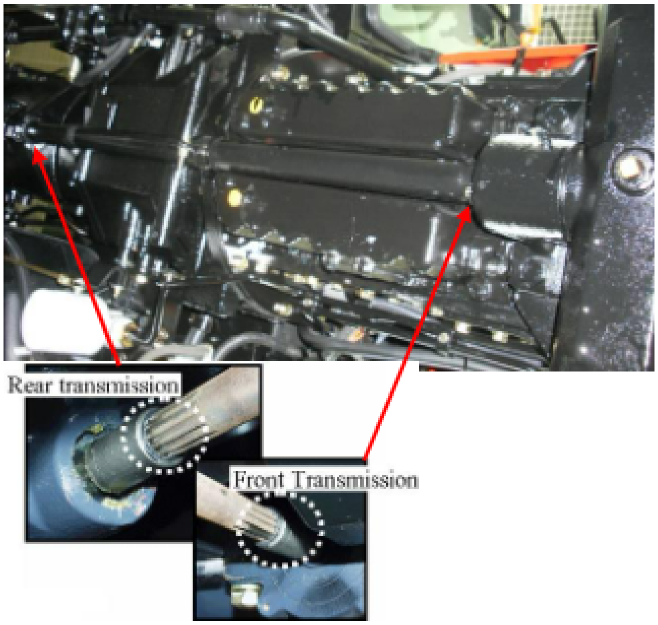


Fig.2-7 Drive shaft (4WD)

(2) Installation

1) Install the front axle assembly.

2) Install six bolts connecting the front axle supports with the front axle support

Note : Apply grease to the bushing and fill the oil seal with grease ahead of time. Install the oil seal carefully not to allow its lips to turn over.

3) Install both of the right and the left steering hose.

4) Install the drive shaft (4WD)

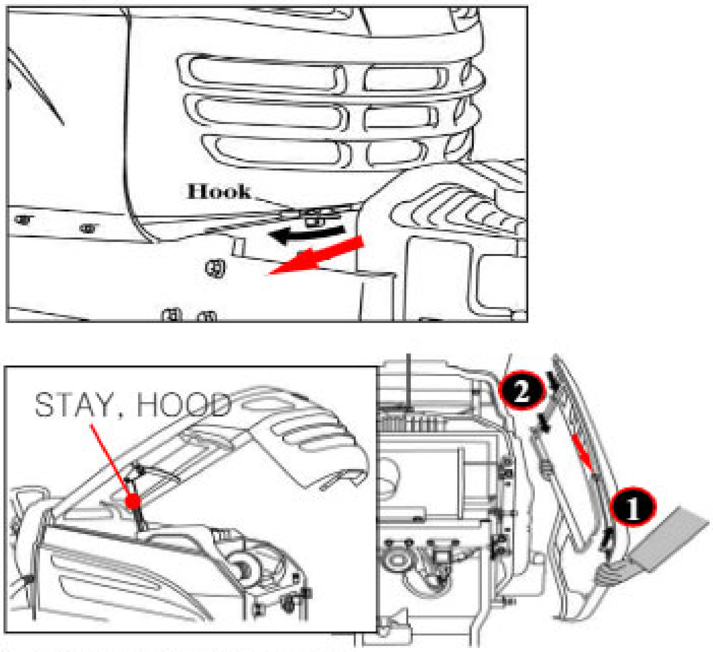
2. SEPARATION OF THE ENGINE AND THE FRONT AXLE SUPPORT

Parts which can be inspected during this operation

-Air cleaner -Radiator -Engine front part.

(1) Removal

1) Hold or support the engine with a crane or stands.
2) Hold or support the front bracket or the axle bracket in a manner that the part other than the engine can be removed if required.
3) Open the engine hood.
4) Remove the side covers (RH and LH) and engine hood (Electrical wire Included)



▶ Opening the Side cover

To open, (1) grasp the side cover, push the cover upward and pull it out to separate from the cover holder and (2) pull the cover forward,

Fig.2-8 Side cover (LH, RH)

5) Disconnect the negative and positive battery cables.

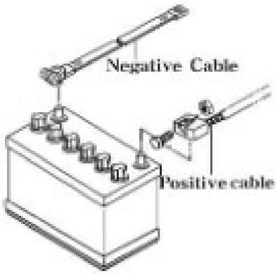


Fig.2-9 Battery

6) Remove the engine harness assy and other wirings.

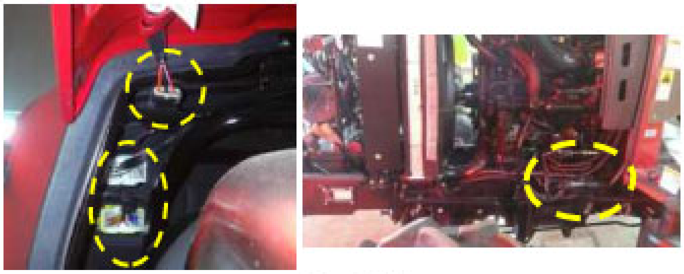


Fig.2-10

7) Remove the upper hose, lower hose and drain hose from the radiator.

Note : The radiator should be drained of the coolant ahead of time and remove the 4WD drive shaft.

8) Remove the two hoses for the power steering system or in the middle of the hoses. Disconnect the couplers of oil cooler pipes

9) Remove the inlet pipe of the air cleaner.

Note : When the pipes related to the hydraulic system are removed, their openings should be covered with plastic caps or the like to keep out dust or other foreign matter.

10) Remove the front axle support from the engine after removing the bolts.

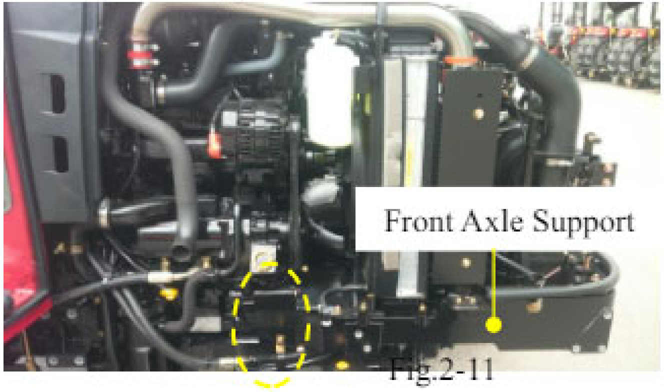


Fig.2-11

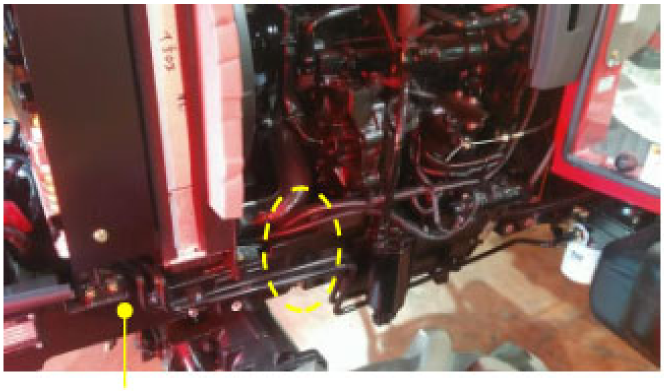


Fig.2-12

(2) Installation

Reassemble in reverse order of removal.

1) Install the front axle support with the engine.
2) Retighten the bolts in the front axle support. (LH, RH)
3) Connect the piping of the power steering system. Connect the oil cooler pipes.
4) Connect the upper, lower and drain radiator hoses.
5) Install the inlet pipe of the air cleaner.
6) Connect the wiring of the engine harness and other electric wire
7) Connect the ground strap and the battery cables.
8) Install the engine hood.
9) Install the side covers.
10) Fill the radiator with coolant.
11) Install the drive shaft (4WD)

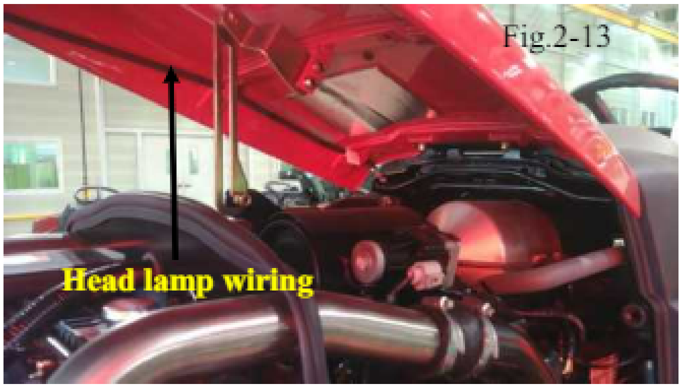


Fig.2-13

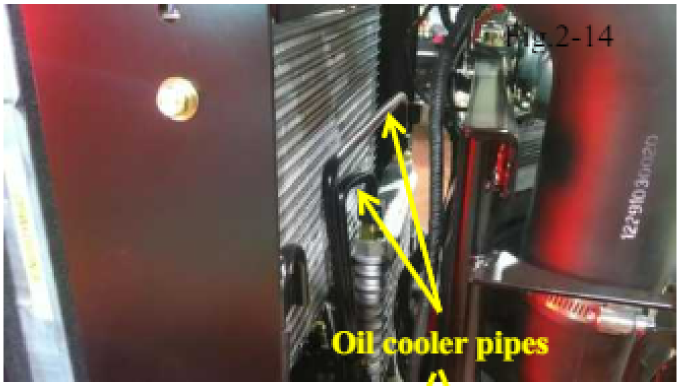


Fig.2-14

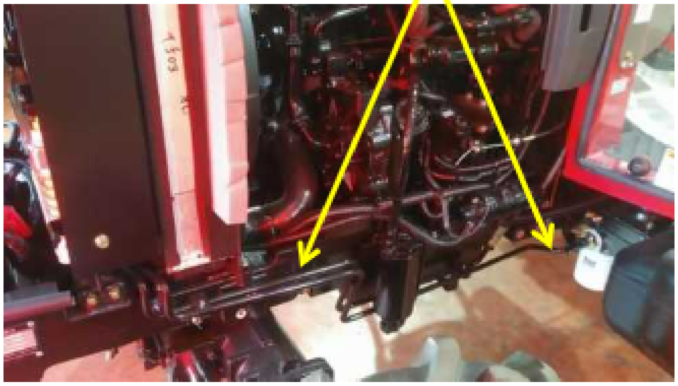


Fig.2-15

3.SEPARATION OF THE ENGINE AND THE FRONT TRANSMISSION.

Parts which can be inspected during this operation

-Fly wheel -Damper -HST unit -Radiator

(1) Removal

1) Remove the front drive shaft.

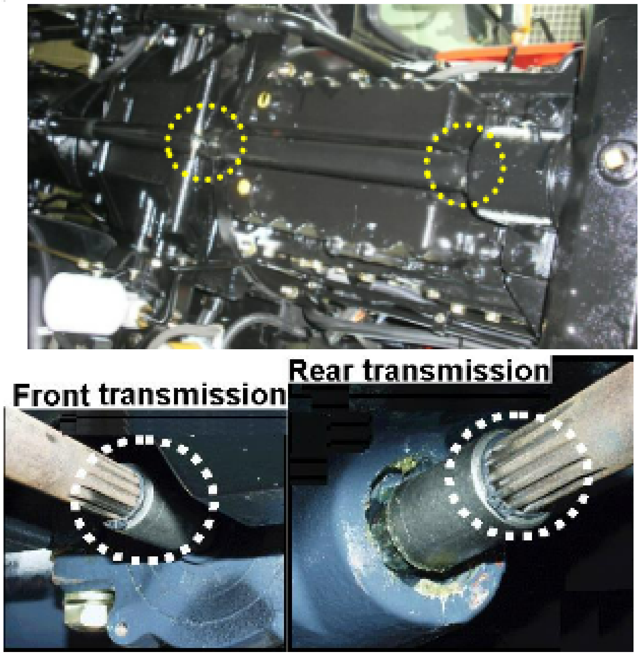


Fig.2-16

2) Support the engine on the bottom with a jack or stands.
3) Hold the transmission with a garage jack or a crane so that the transmission side can be moved when needed.
4) Remove the side covers (RH, LH) and the engine hood assembly (Electrical wire Included).

   To open the hood, pull the hook release lever forward, grasp the side cover, pull it at the top slightly and lift it up.

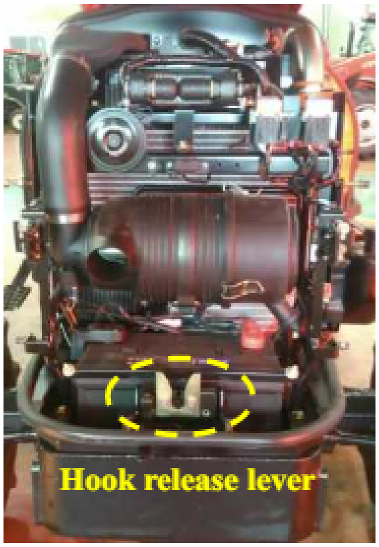


Fig.2-17

5) Detach the hood lamp wiring harness, other wiring harness. Remove the hood assembly and hood supports.

Note : The hood assembly should be removed when needed

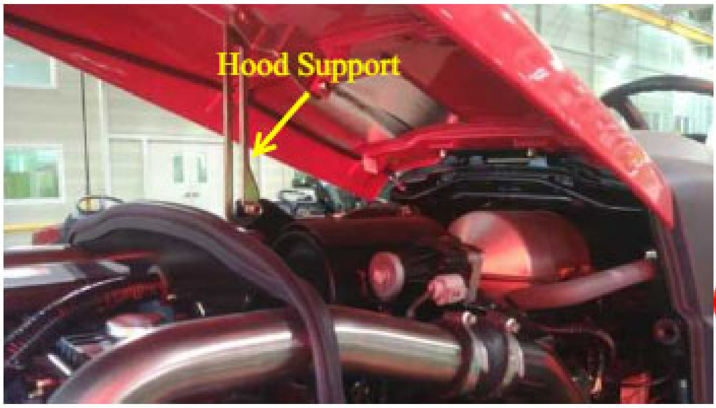


Fig.2-18

6) Disconnect the battery cables and the engine harness.

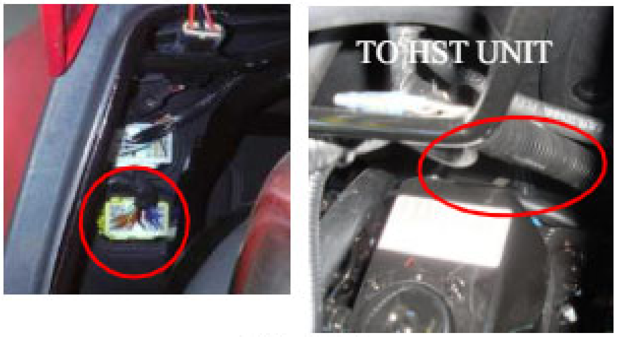


Fig.2-19

Note : Disconnect the other wiring couplers

7) Remove steering hoses (LH, RH), oil cooler pipe, hydraulic pipe and accelerator wire.

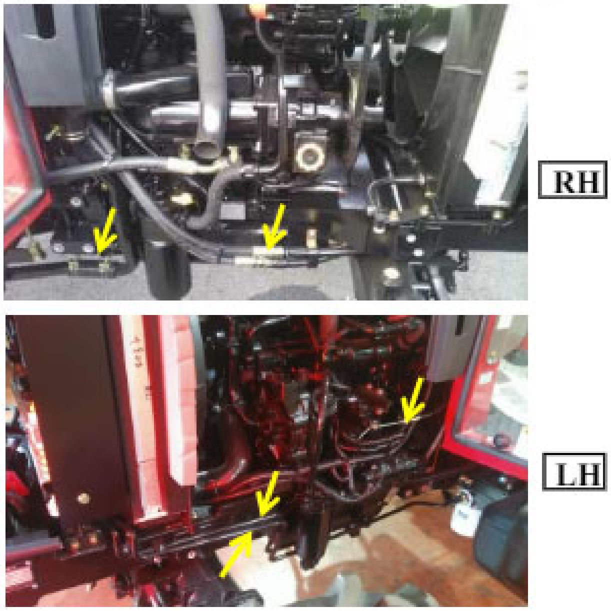


Fig.2-20

9) Remove the coupler (Air-con hose) and heater hoses.

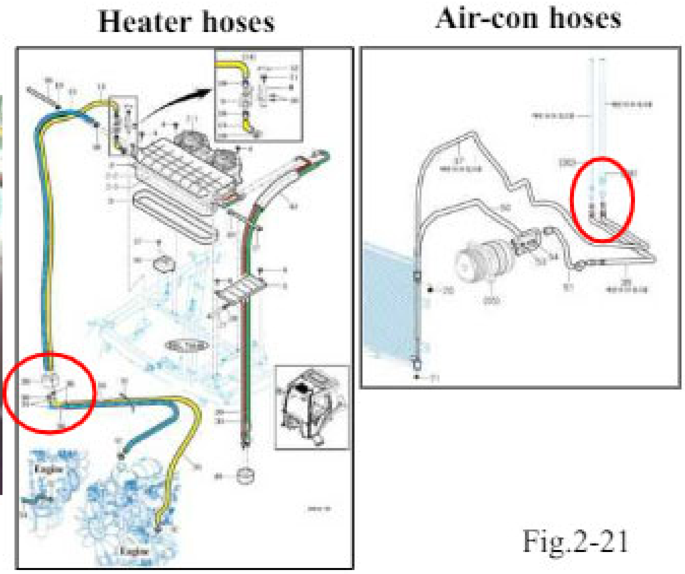


Fig.2-21

10) Separate the engine from the transmission assembly after removing the bolts and nuts as shown below.

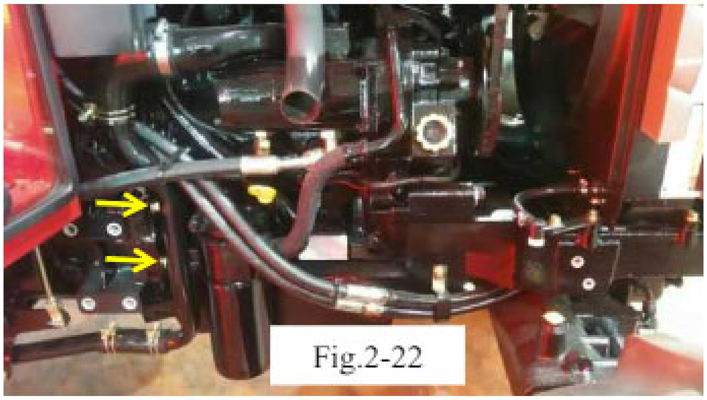


Fig.2-22

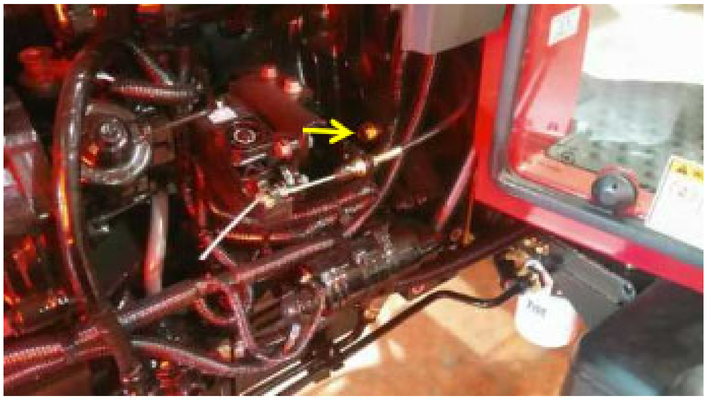


Fig.2-23

Refer to the description in the parts catalogue

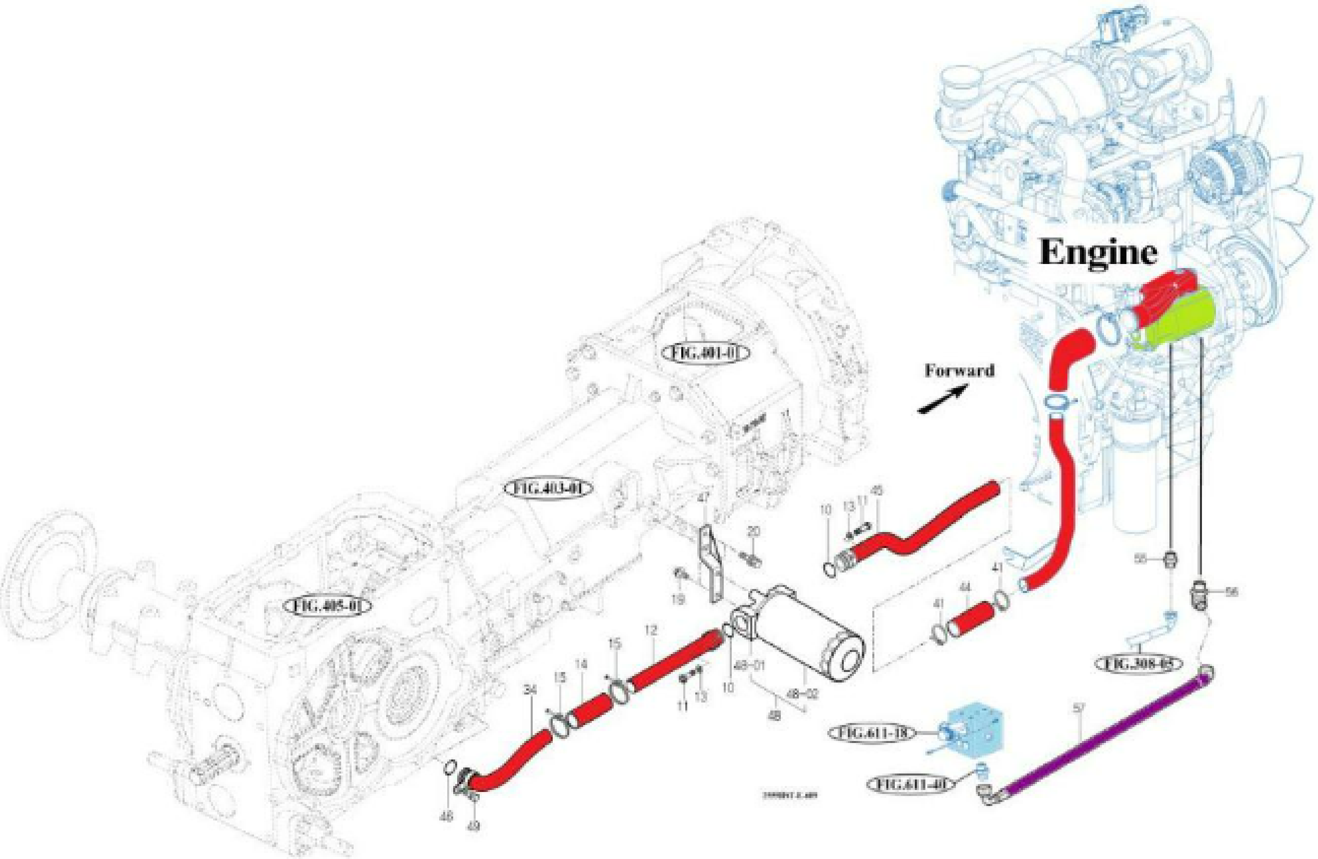


Fig.2-24 Hydraulic Line ; Tank → Pump → PTO Valve

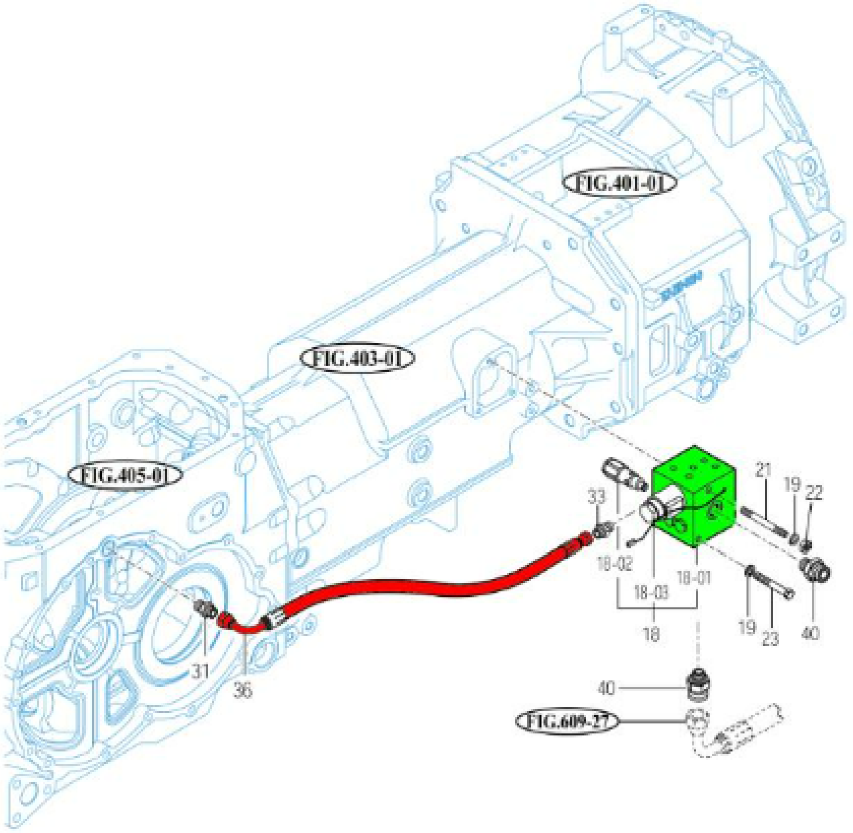


Fig.2-25 Hydraulic Line ; PTO Valve → PTO Clutch

Refer to the description in the parts catalogue

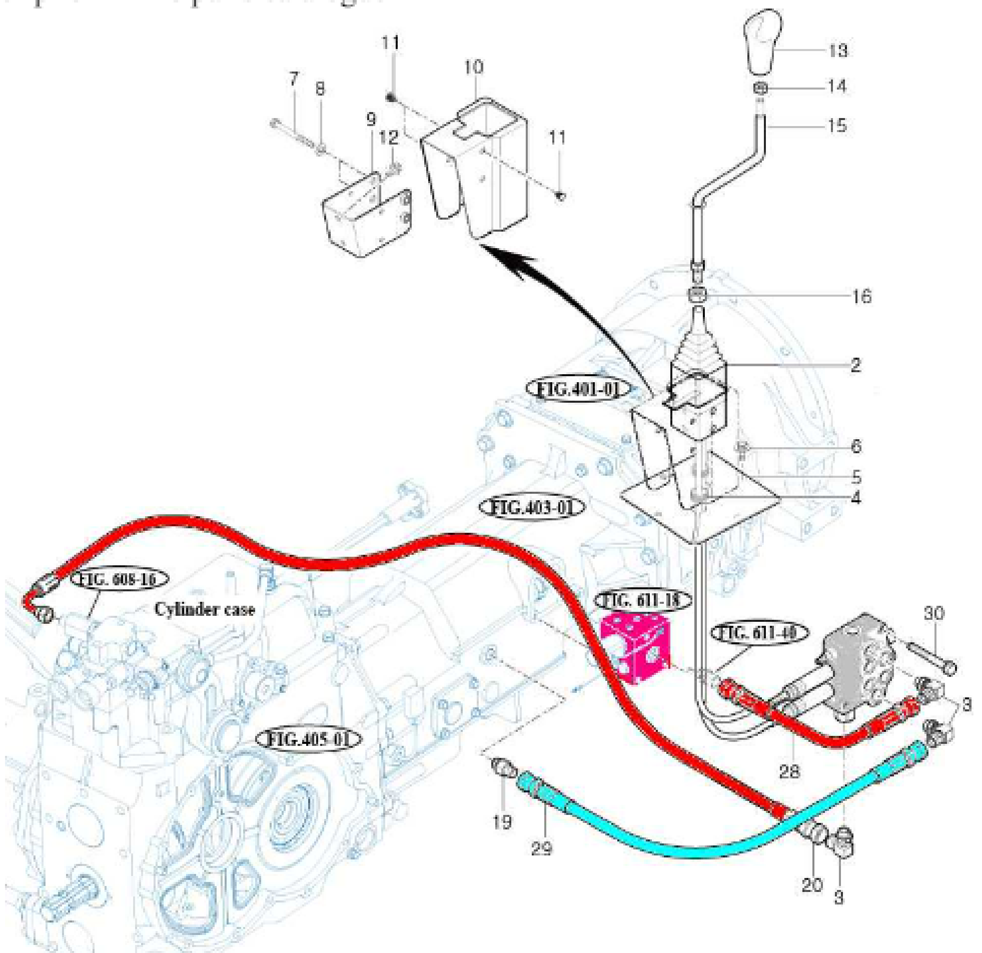


Fig.2-26 Hydraulic Line ; PTO Valve → Loader Valve → Remote Valve (2655 SH)

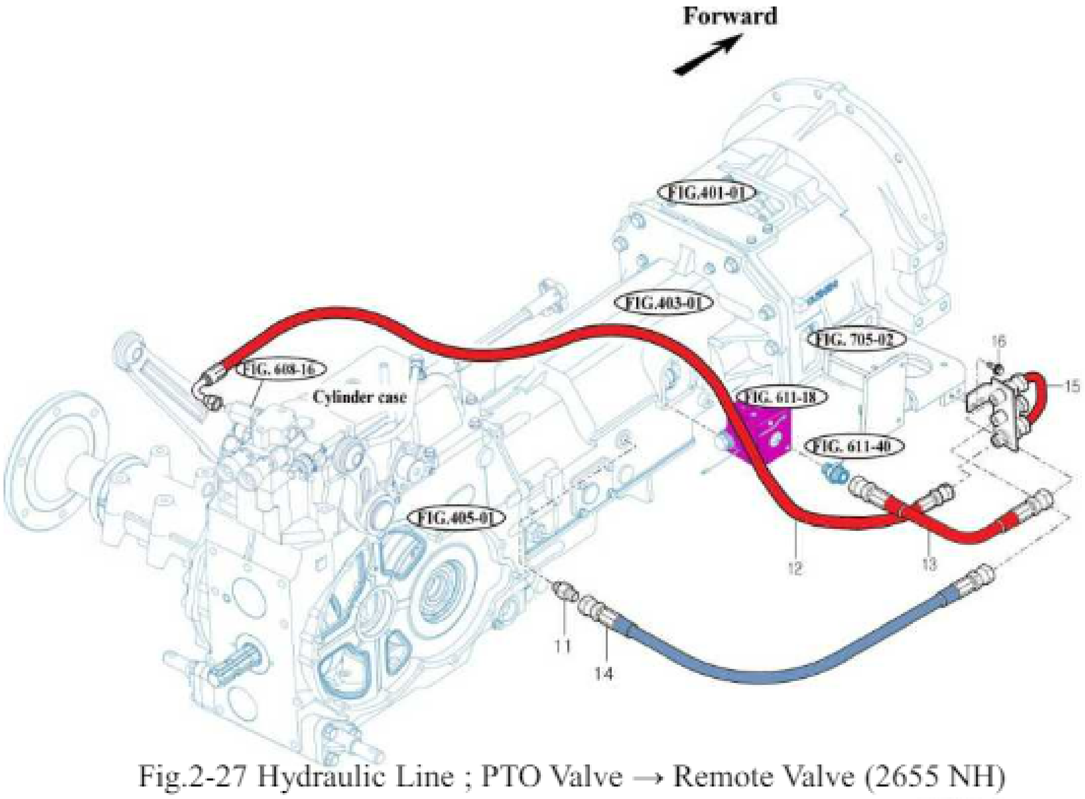


Fig.2-27 Hydraulic Line ; PTO Valve → Remote Valve (2655 NH)

Refer to the description in the parts catalogue

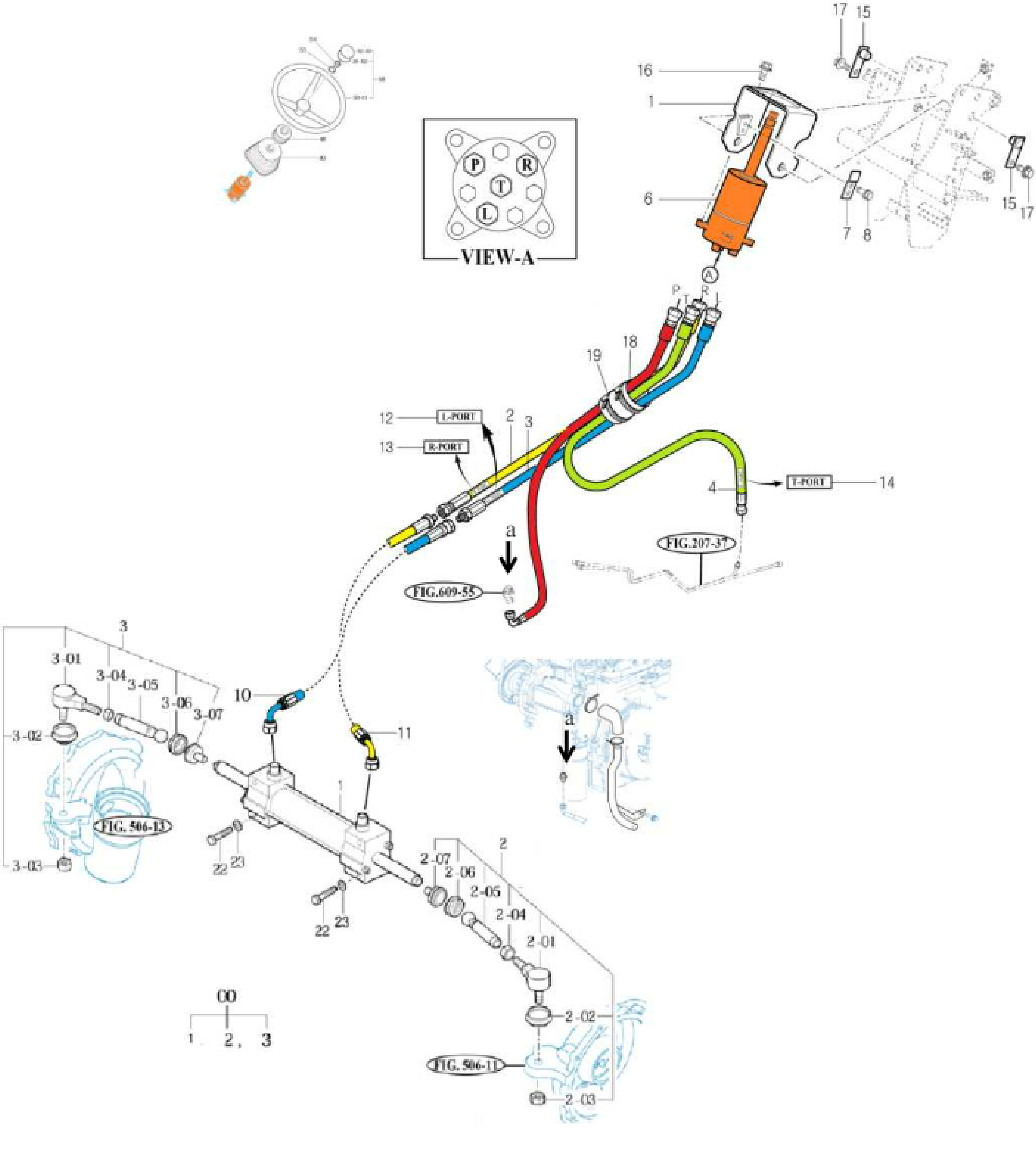


Fig.2-28 Power Steering Line

Refer to the description in the parts catalogue

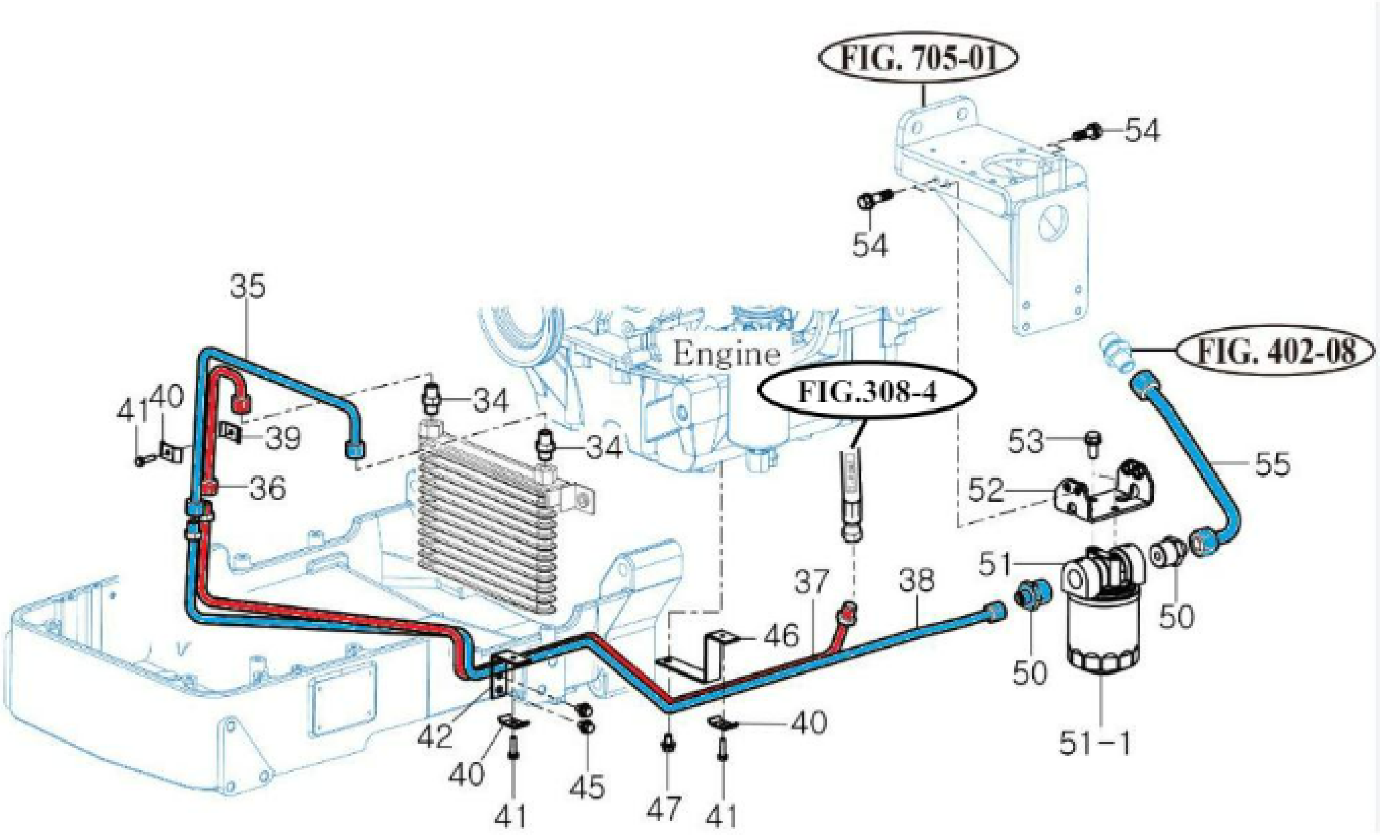
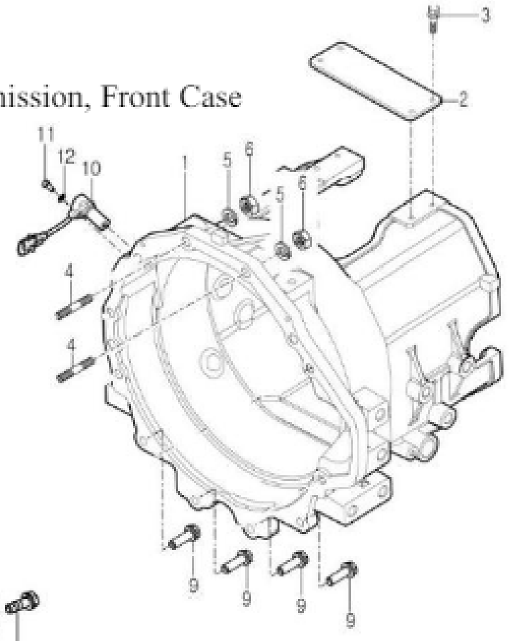


Fig. 2-29 Oil cooler

Fig.2-30 Transmission, Front Case



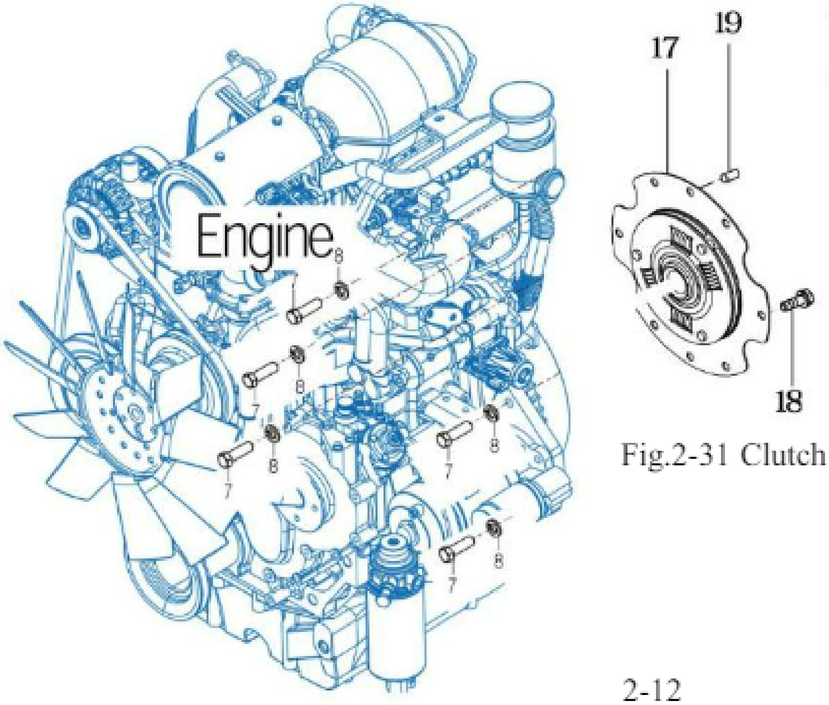


Fig.2-31 Clutch (Damper)

Refer to the description in the parts catalogue

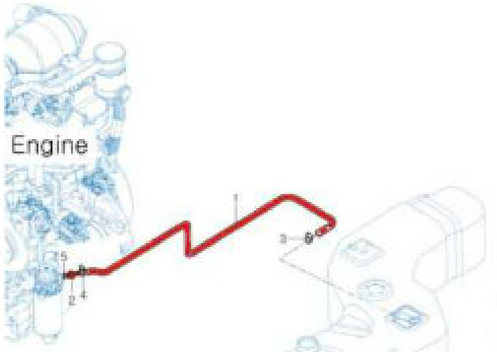


Fig. 2-32 Fuel Hose & Filter

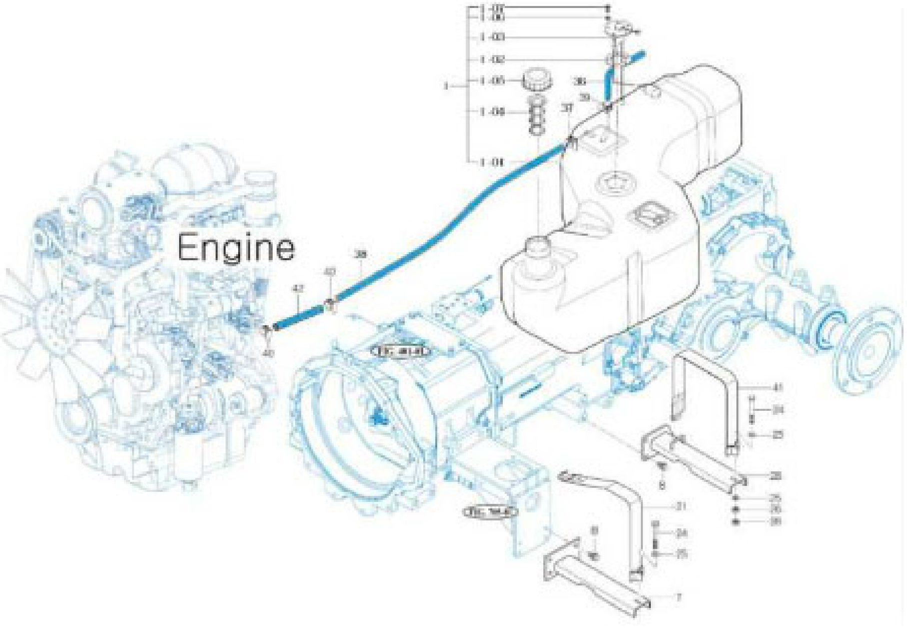


Fig. 2-33. Fuel Tank

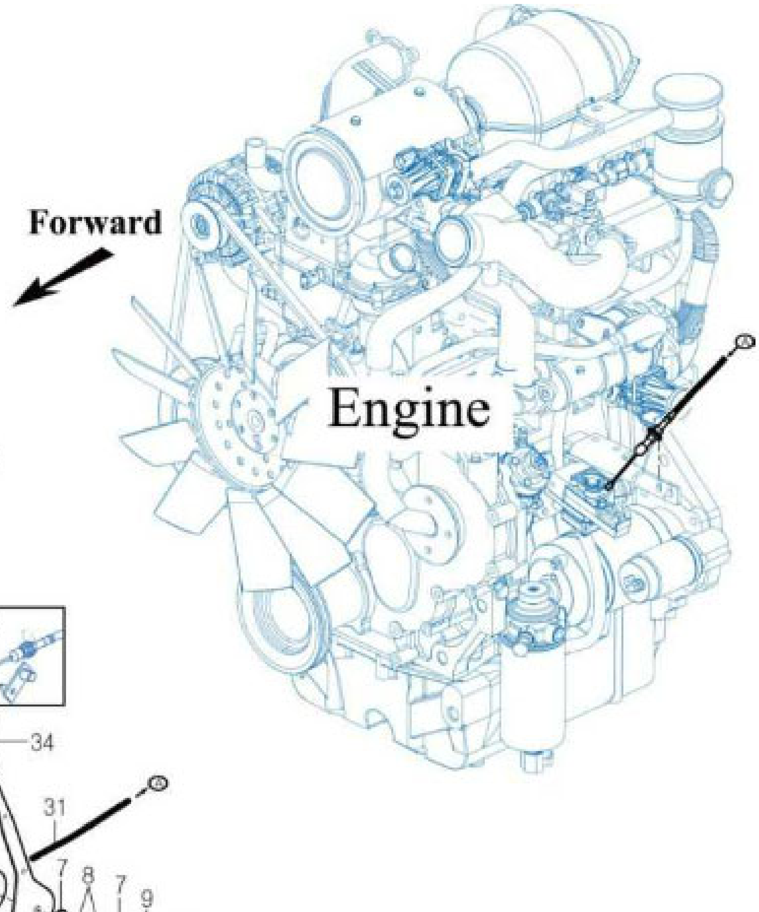
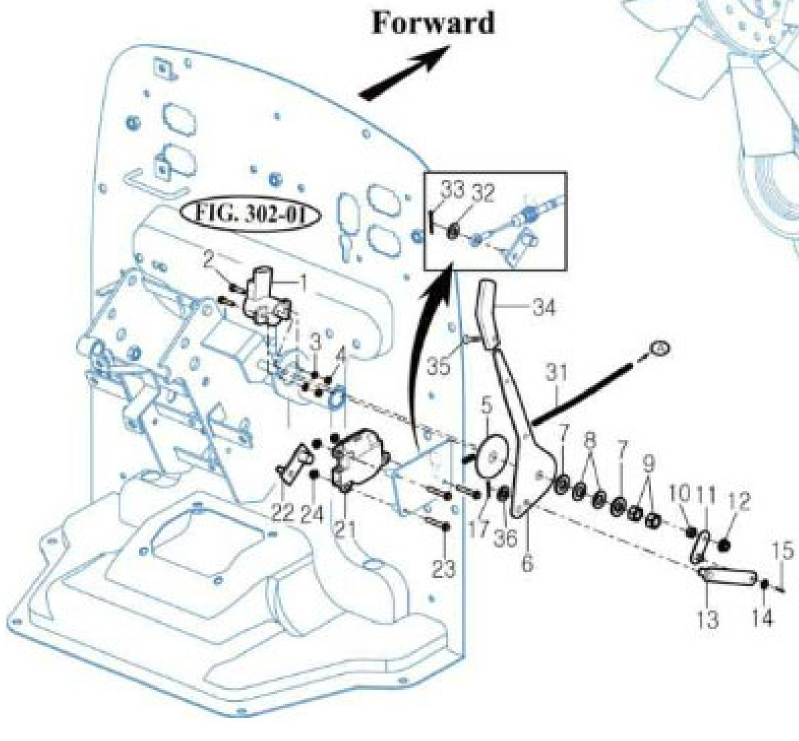


Fig. 2-34 Accelerator



2555SH-E-206

Refer to the description in the parts catalogue

Fig. 2-35 Front Axle Support

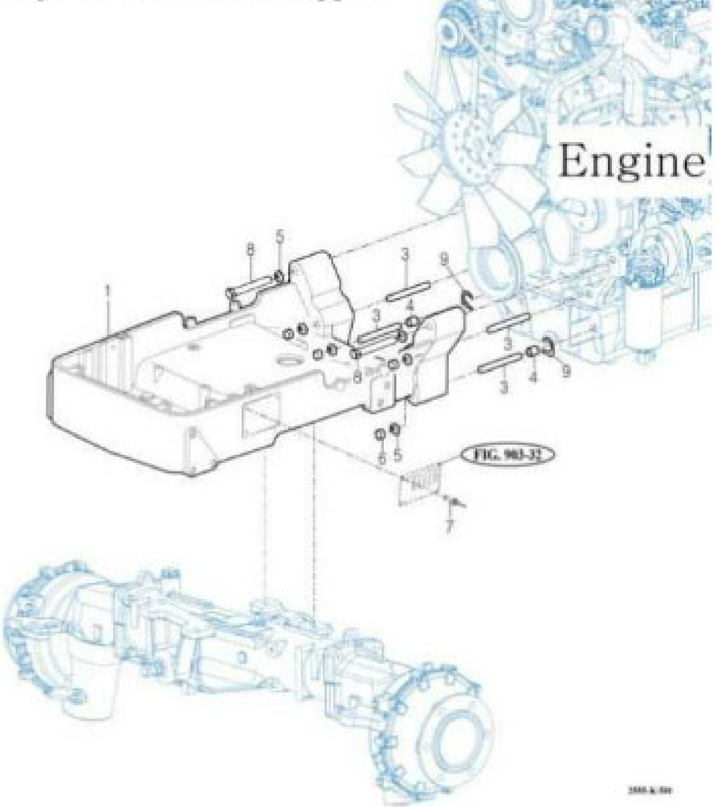


Fig. 2-38 Heater & Air Conditioner

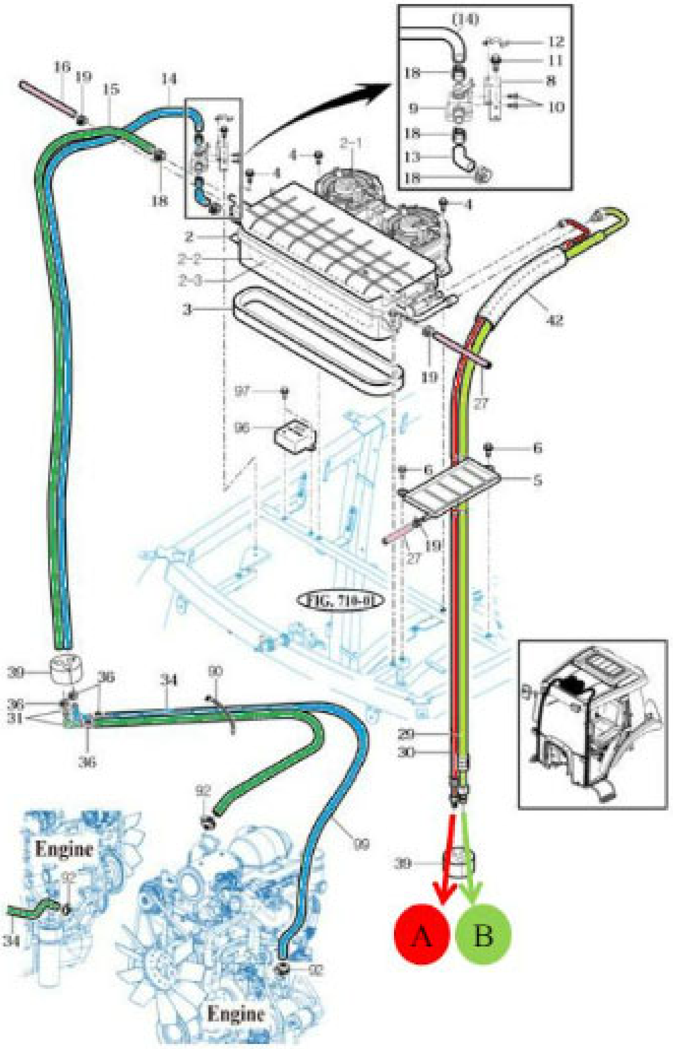
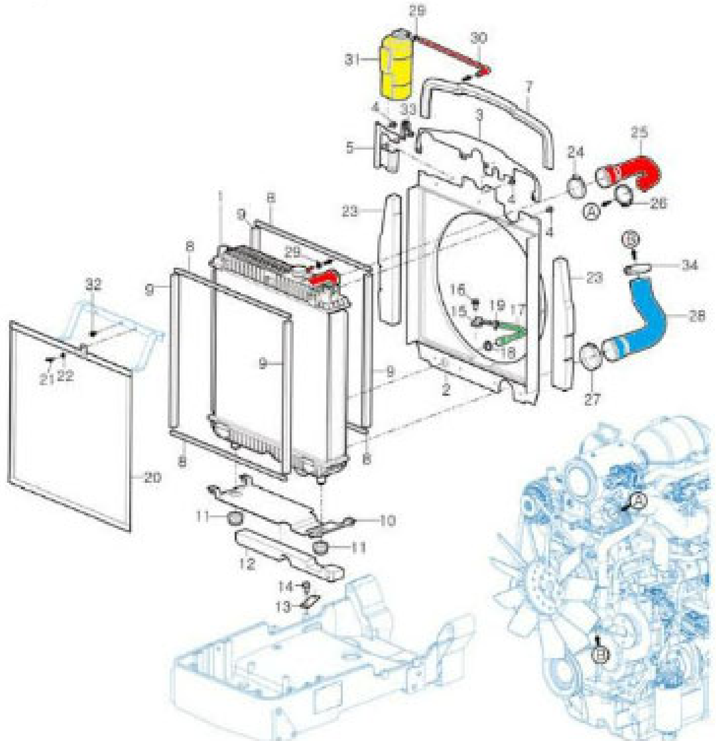


Fig. 2-37 Radiator



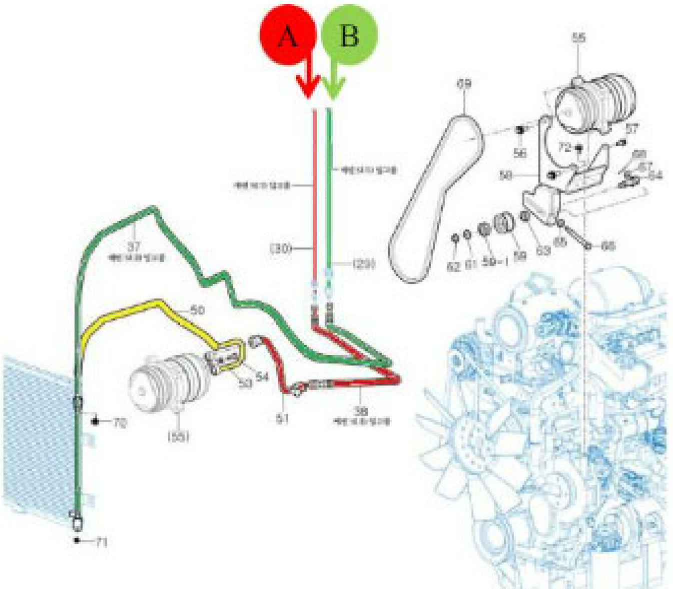


Fig. 2-39 Air Conditioner

(2) Engine separation from the front axle support

When separating the engine from the chassis, the following steps are required as well as the ones mentioned below.

1) Lift the engine with the hoist and hold the front axle support with a stands or the like.

2) Disconnect the upper, Lower, and drain hoses from the radiator. And remove the radiator assembly.

Note : The radiator should be drained of the coolant ahead of time.

3) Disconnect the wiring harness (HST UNIT) if required.

4) Disconnect the three hoses of power steering system and the accelerator wire if required.

5) Remove the fuel hose and the drain hose if required.

6) Disconnect the hydraulic line if required.

7) Wedge both sides of the front axle to prevent the engine from tilting.

8) Separate the engine from the front axle support after removing the bolts.

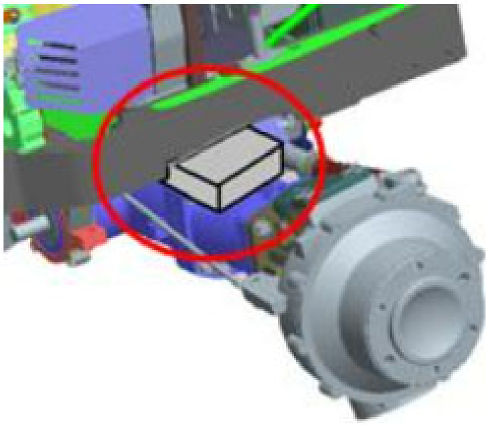


Fig.2-40 Wedging

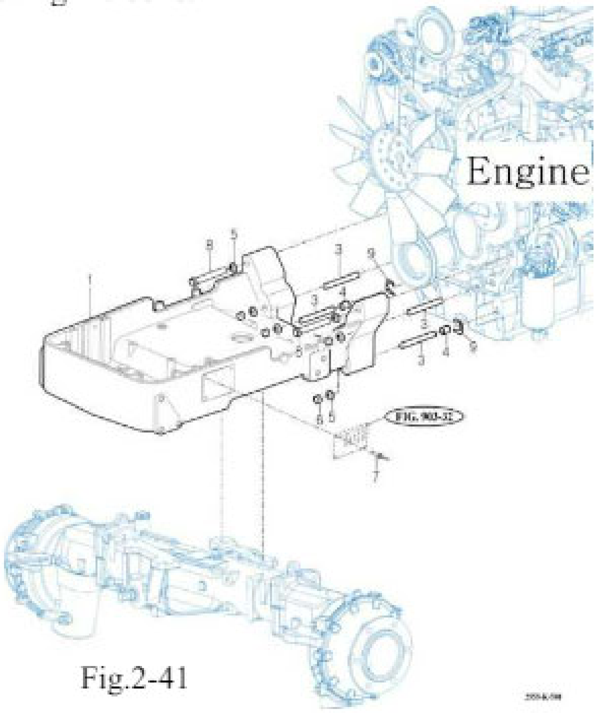


Fig.2-41

(3) INSTALLATION

REASSEMBLE IN REVERSE ORDER OF REMOVAL.

1) Install the engine on the front axle support.

2) Assemble the engine and the transmission assembly

Note : Apply adhesive (THREE BOND 1104E) to the contact surfaces of the front transmission case and the housing of engine side ahead of time (If required).

Note : Apply small mount of fresh Molybdenum grease (THREE BOND 1901) to the tooth of the input shaft. Be careful not to apply excessive amount of grease. During operation, be sure to avoid any of the reassembly operations that may place load upon the input gear.

3) Install the power steering hoses and hydraulic piping line and oil cooler line.

4) Install the fuel hose and the drain hose.

5) Connect the wiring harness.

6) Install the radiator assembly and hoses.

7) Install the three hoses of power steering system and the accelerator wire if required.

8) Connect the battery terminals.

9) Install the engine hood and side cover.

4. SEPARATION OF THE FRONT TRANSMISSION AND SPACER TRANSMISSION

Parts which can be inspected during this operation

- HST unit

(1) Removal

A : Removal of the cabin

Note: Remove the cabin referring to “SECTION 3-3 **SEPARATION OF THE ENGINE AND THE FRONT TRANSMISSION.**

1) Remove the side covers (LH and RH) after opening the engine hood.

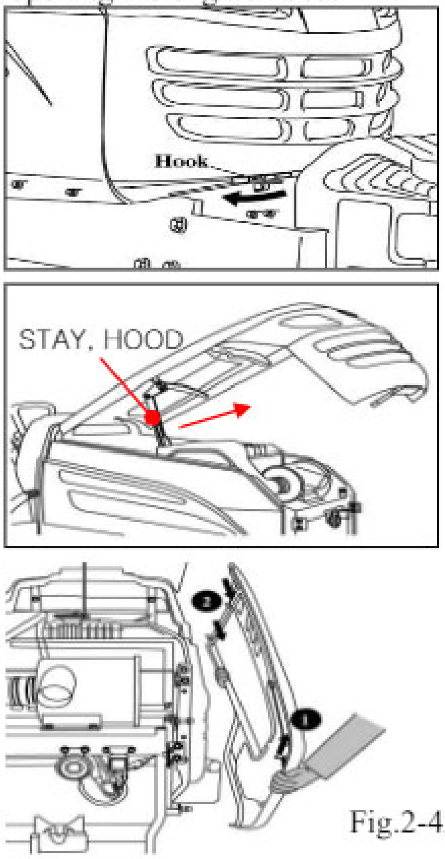


Fig.2-42

2) Disconnect the battery cables.

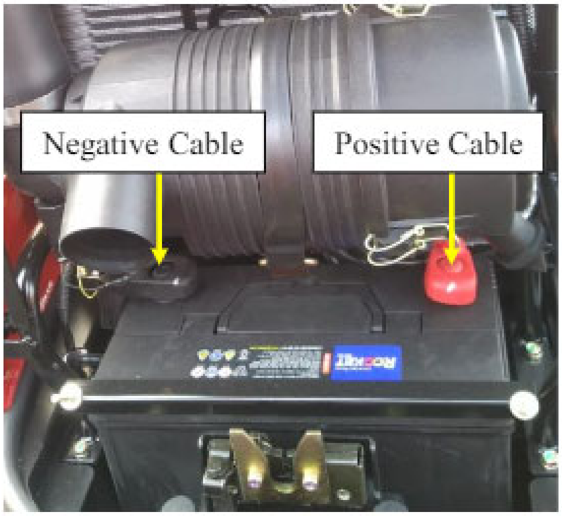


Fig.2-43

Note : Disconnect the other wiring couplers

3) Disconnect the head lamp wiring harness, and the HST unit wire under the floor.

Disconnect the engine harness from main harness

Note : The hood assembly should be removed when needed.

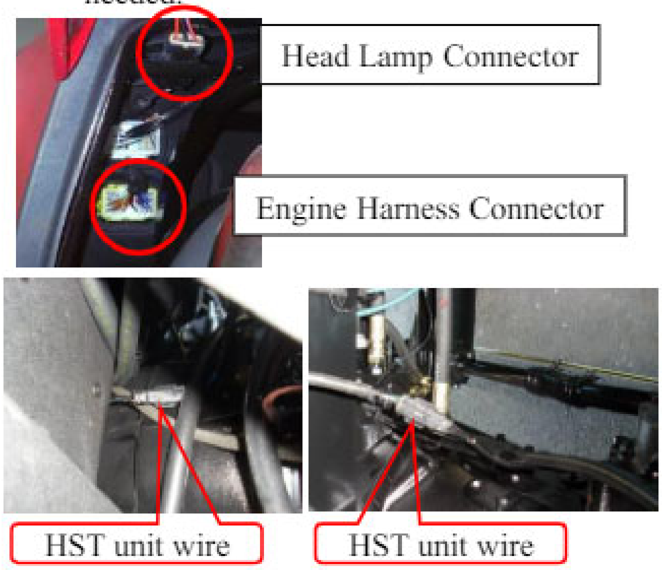


Fig.2-44 Wiring harness

4) Disconnect four power steering hoses, accelerator wire.

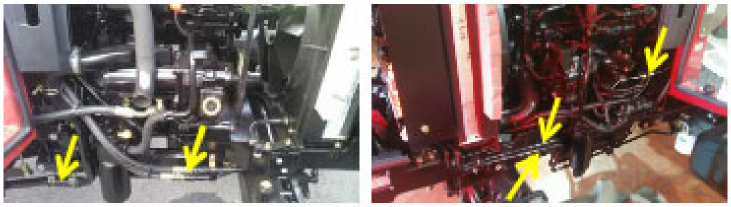


Fig.2-45

5) Remove the retaining pin of brake rods under the floor.

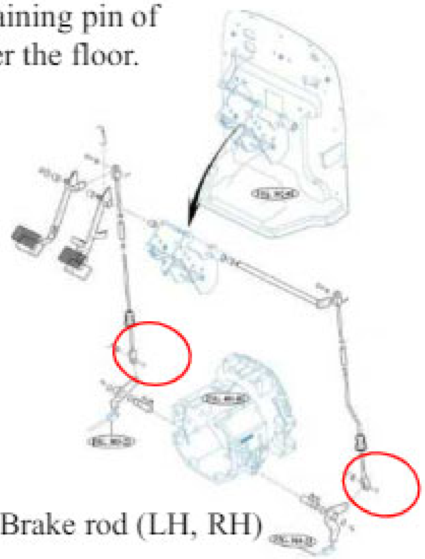


Fig.2-46 Brake rod (LH, RH)

6) Remove the slow-return check valve knob.

7) Remove the diff-Lock pedal.

8) Remove the Sub-shift lever. The levers can be separated in the middle.

9) Remove the PTO shift lever if required, the slow return lever and the 4WD shift lever. 4WD shift lever can be separated in the middle.

10) Remove the cover and the knobs of position, draft control levers, external hyd. levers if required.

Note : The external hyd. and position lever should be removed in the middle of the linkage as shown below.

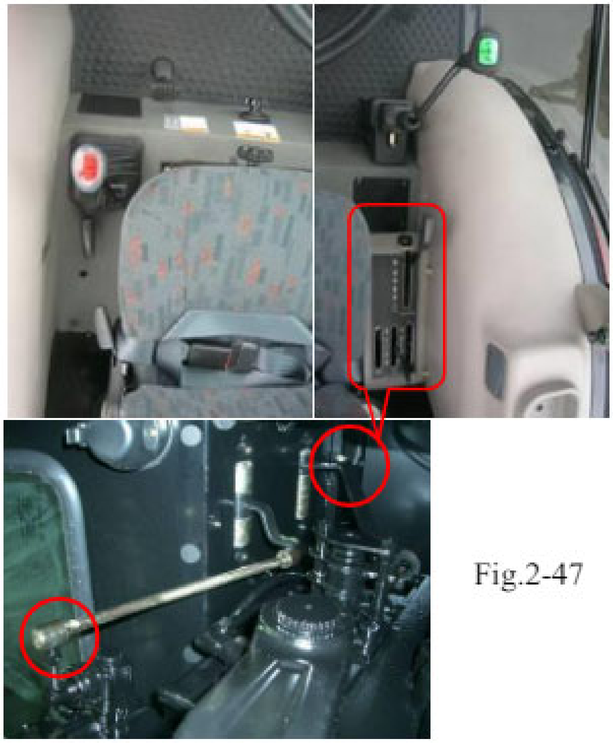


Fig.2-47

11) Remove the heater hoses (2 points ; A, B) or the hoses can be separated in the middle(C).

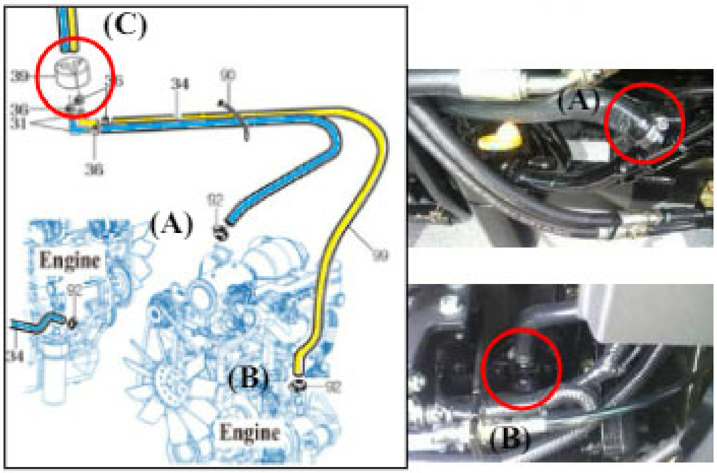


Fig.2-48 Heater hoses (LH)

12) Remove the coupler (Air-con hose).

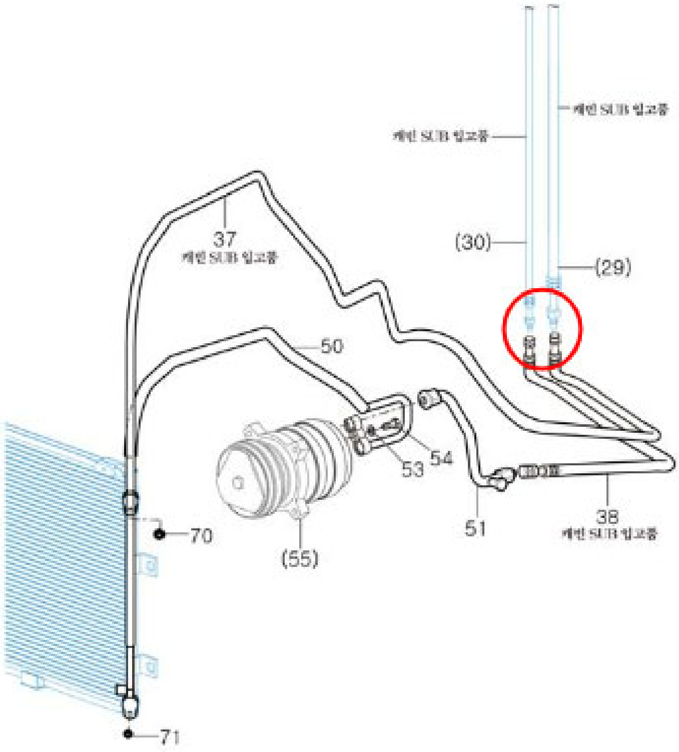


Fig.2-49

13) Remove the bolts (4 points).

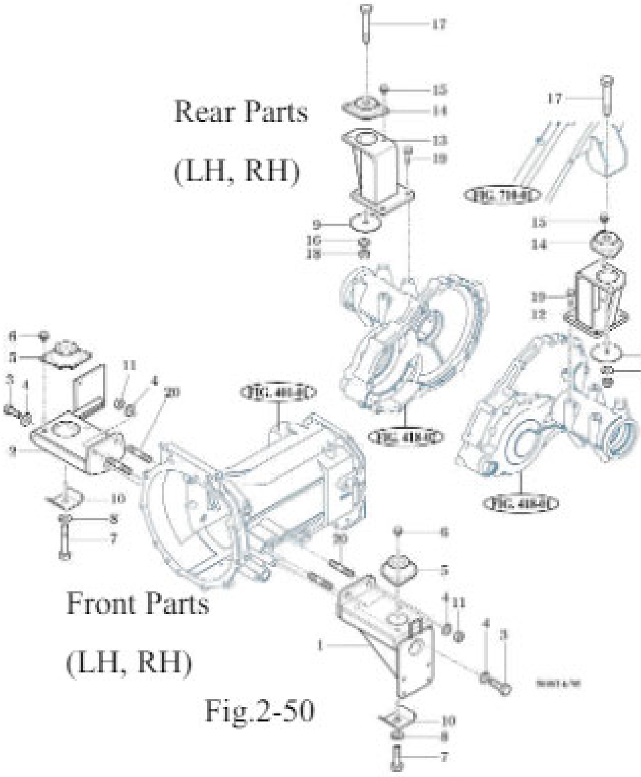


Fig.2-50

14) Lift the cabin gradually taking care not to allow the shaft of the slow-return check valve and its hole in the floor to interfere with each other.

Note : Lift up the cabin gradually making sure that all relevant **wiring**. Piping, cock and links are disconnected.

Hold the Cabin assembly with the rope at the four corners as shown below.

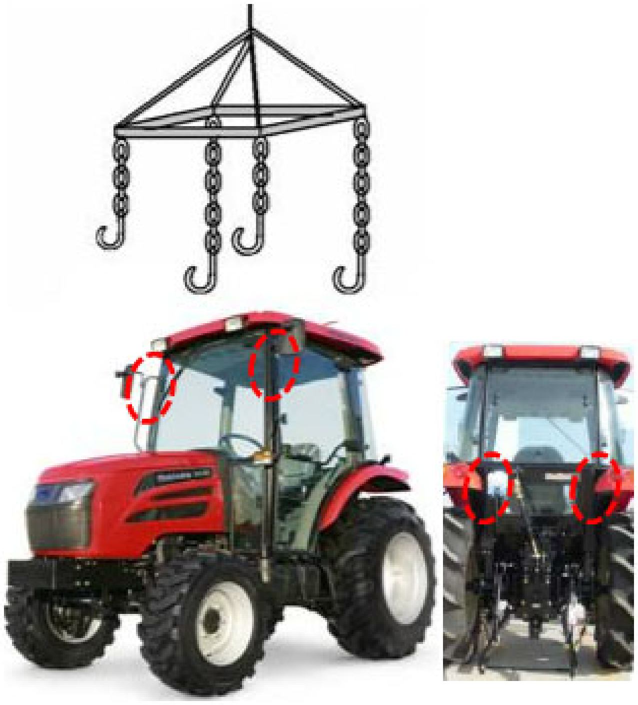


Fig.2-51 4 hangers to be lifted

(2) Installation

Reassemble in reverse order of disassembly.

Note : Be careful not to mix the LH, RH direction of the power steering hoses.

If the steering will be confused, the engine should be stopped at once.

Note : When reinstalling the Cabin assembly, the brake rod should be adjusted.

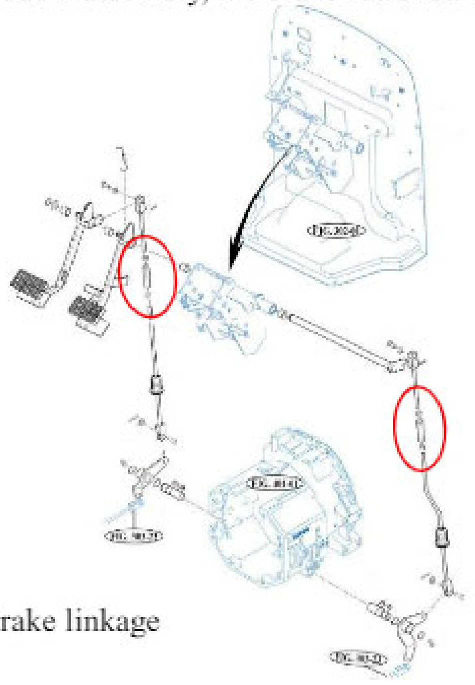


Fig.2-52 Brake linkage

B: Division of the chassis.

(1) Removal

1) Drain the transmission case of oil

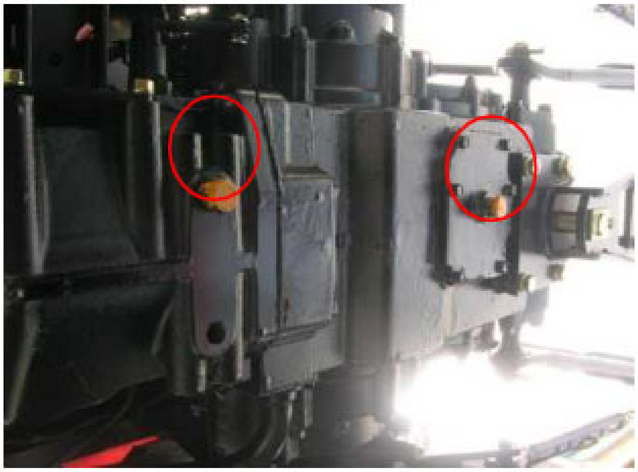


Fig. 2-53 : 2 plugs to be drained

2) Wedge both sides of the front axle to prevent the engine from tilting.
3) Remove the front wheel drive shaft.
4) Hold or support the cabin with a crane or stands if required.
5) Place a jack under the bottom of the front transmission case to support.
6) Place a jack under the bottom of the rear transmission case to support.
7) Remove the Sub-shift lever, slow return lever and diff-lock pedal.
8) Remove the control rods of the PTO shift if required, and 4WD shift levers from the transmission.
9) Remove the position, external hyd. levers and Joy-stick valve.
10) Remove the rear tire assembly.
11) Remove the brake rods (LH, RH)
12) Remove the fuel tank and the fuel hoses.
13) Remove the suction, delivery and drain pipes in the middle and the drain pipe of power steering valve and the intercooler pipe from HST unit.
14) Remove the delivery pipe to the PTO valve from joystick valve if required.
15) Remove the cover.

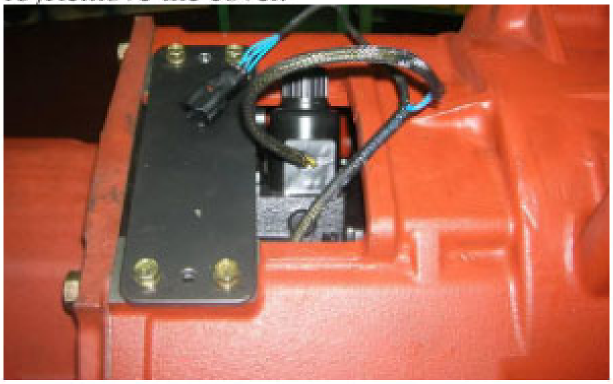
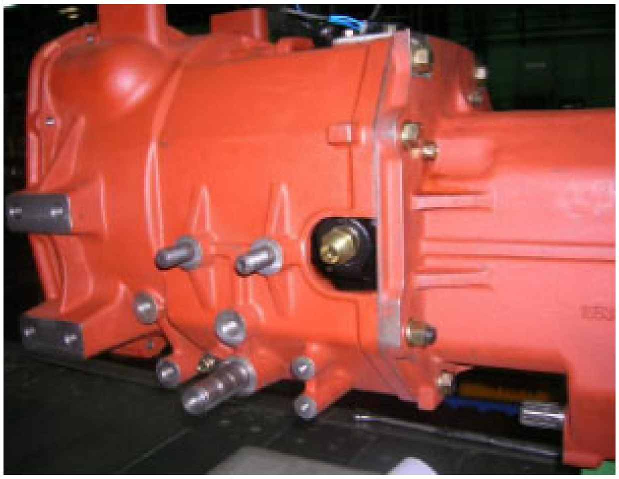
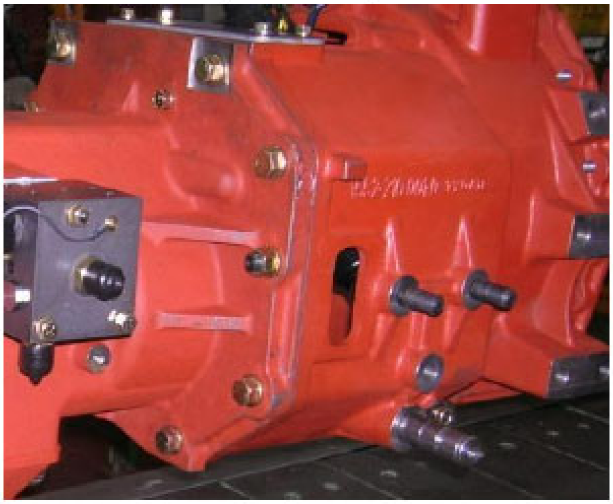


Fig.2-54 The cover of the HST unit

16) Remove the bolts which tighten the front transmission and spacer transmission cases.



(Left Hand)



(Right Hand)

Fig.2-55 The position of the bolts and the nuts

17) Move the rear part of the tractor rearwards by pushing the rear wheels by hand, and then the spacer and rear transmission assembly will be separated from the front transmission.

Note :When moving the rear part of the tractor, be careful not to allow the garage jack to shift from the front transmission case.

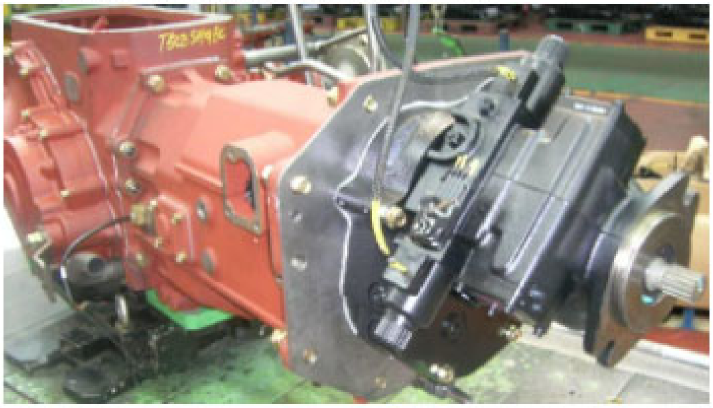


Fig.2-56 The state under separation

(2) installation

Reassemble in reverse order of disassembly.

1) Assemble the front and spacer transmission. (Tightening torque : 1,300~1,500 kg-cm)

Note : When installing the front transmission along with Engine assembly to the spacer transmission, forced installation of the each transmission should be avoided, it should not be damaged.

2) Install the cover on the front transmission case.

3) Install the delivery pipe to the valve from the joy stick valve if required.

4) Install the suction, delivery and drain pipes and the drain pipe of power steering valve and the intercooler pipe to HST unit.

5) Install the fuel tank and the fuel hoses.

6) Install the brake rods (LH, RH).

7) Install the rear tire assembly.

8) Install the position, draft control levers, external hyd. levers and Joy-stick valve.

9) Install the control rods of the PTO shift if required, and 4WD shift levers to the transmission.

10)Install the Sub-shift lever, slow return lever and the diff-lock pedal.

11)Install the front wheel drive shaft after moving a jack under the bottom of the rear transmission case to support.

5. SEPARATION OF THE SPACER TRANSMISSION AND THE REAR TRANSMISSION

Parts which can be inspected during this operation

-Sub shift gear - Drive pinion gear - 4WD drive gear

(1) Removal

1) Remove the cabin referring to "SECTION 3-4-(1) A ; Removal of the cabin" when separating the spacer and rear transmission cases from each other.

2) Remove the rear transmission referring to SECTION 3-4-(1) B : Division of the chassis.

3) Remove the 4WD shift metal, the sub shift metal.

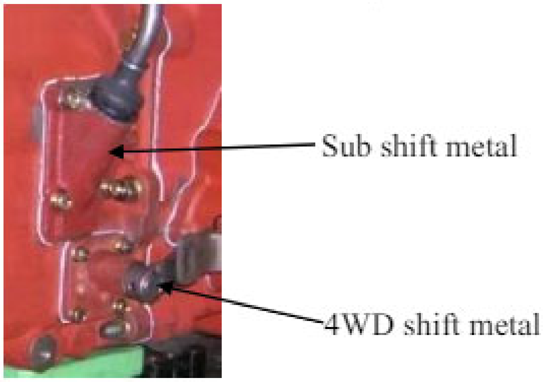
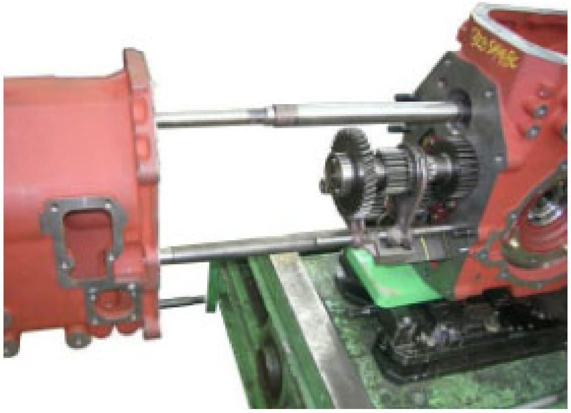


Fig.2-57 4WD shift, Sub shift metal

4) Remove the bolts which tighten the spacer transmission and the rear transmission cases.



Bolt : 1 x M12-35, 5 x M14-40

Nut : 5x M14, Pin : 2 x D10-22

Stud Bolt: 1 x M14-35, 2 x M14-40, 2 x M14-80

Fig.2-58 The position of the bolts and the nuts

5) Disengage the shifter link through the opening of the sub change metal(support) and turn the crescent cut-away in the gear upwards.

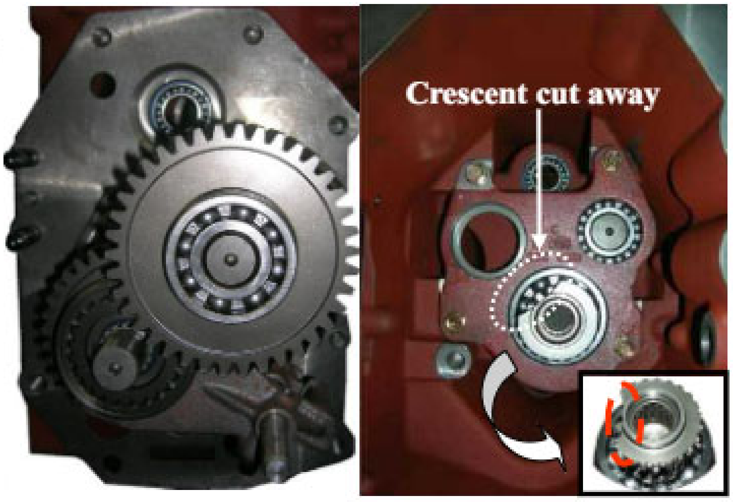


Fig.2-59

6) Move the rear part of the tractor rearwards by pushing the rear wheels by hand.

Note :When moving the rear part of the tractor, be careful not to allow the garage jack to shift from the front transmission case.

(2) Installation

Reassemble in reverse order of disassembly.

Note : The 4WD drive shaft should be installed on the rear transmission ahead of time.

1) Join the rear and spacer transmission cases.

Note: During the operation, be careful not to damage needle bearings, the cut –away part in the gear should be turned upwards without fail so as to clear the gear to be positioned on the upper cut-away part.

2) Install the sub change shifter link and each change metal.

3) Install the brake rods and front drive shaft.

4) Install the hydraulic piping.

5) Install two rear rubber mounts.

6) Install exterior parts.

7) Fill the transmission case with oil: 35ℓ(9.24 US gal)

6. SEPARATION OF THE REAR TRANSMISSION AND REAR AXLE HOUSING

Parts which can be inspected during this operation

-Brakes -Final gears

---

(1) Removal

As both sides can be disassembled in the same way, only left-side will be explained here.

1) Wedge both sides of the front axle support to prevent the engine from tilting.
2) Drain the transmission case of oil
3) Lift up the rear transmission with a crane or a garage jack.
4) Remove the rear tire assembly.
5) Remove the 3-point linkage and related parts.
6) Support the Cabin mounting with a trestle or the like. Hold the cabin frame with the crane.
7) Remove the bolt and the mounting bracket.

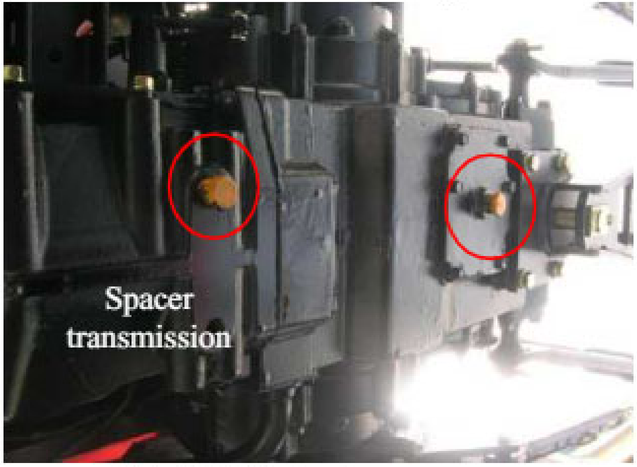


Fig.2-60 Drain plug

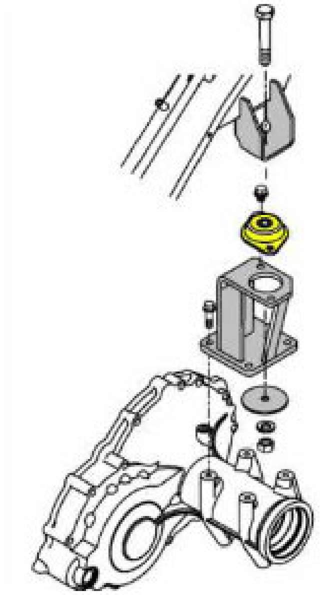
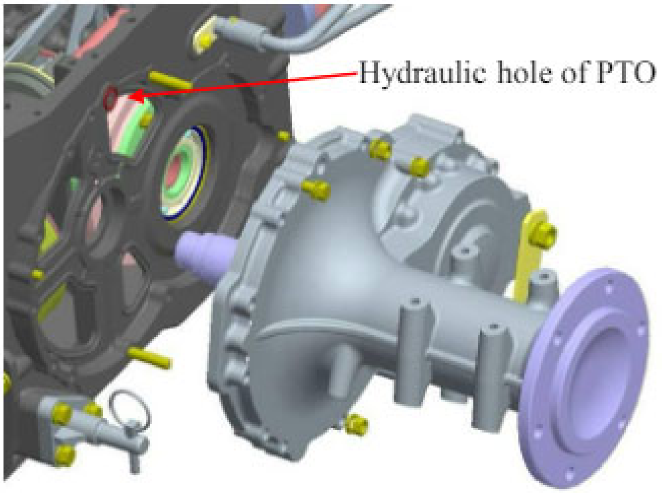


Fig.2-61 Rear mounting

8) Remove the rear axle housing tightening bolts.
9) Detach the rear axle housing from the rear transmission case



Note : When removing the rear axle housing (RH), be careful not to lose the O-ring.

Fig.2-62 Rear axle housing

(2) Installation

Reassemble in reverse order of disassembly.

1) Join the rear axle and rear transmission.
2) Reinstall the other removed parts.
3) Mount the rear wheel.
4) Refill the transmission with oil up to the specified level

Note : Level up to fill the oil can be sought from the rear axle housing (LH) of the rear transmission.

7. SEPARATION OF THE REAR RANSMISSION AND CYLINDER CASE

Parts which can be inspected during this operation

-Control valve -Control linkage -Piston and lift crank linkage -PTO change gears -differential gear

(1)Removal

1) Remove the control linkage of the position lever.
2) When the tractor is equipped with an optional auxiliary valve, remove the slow-return shaft, the delivery pipe, the air breather hose and the levers.

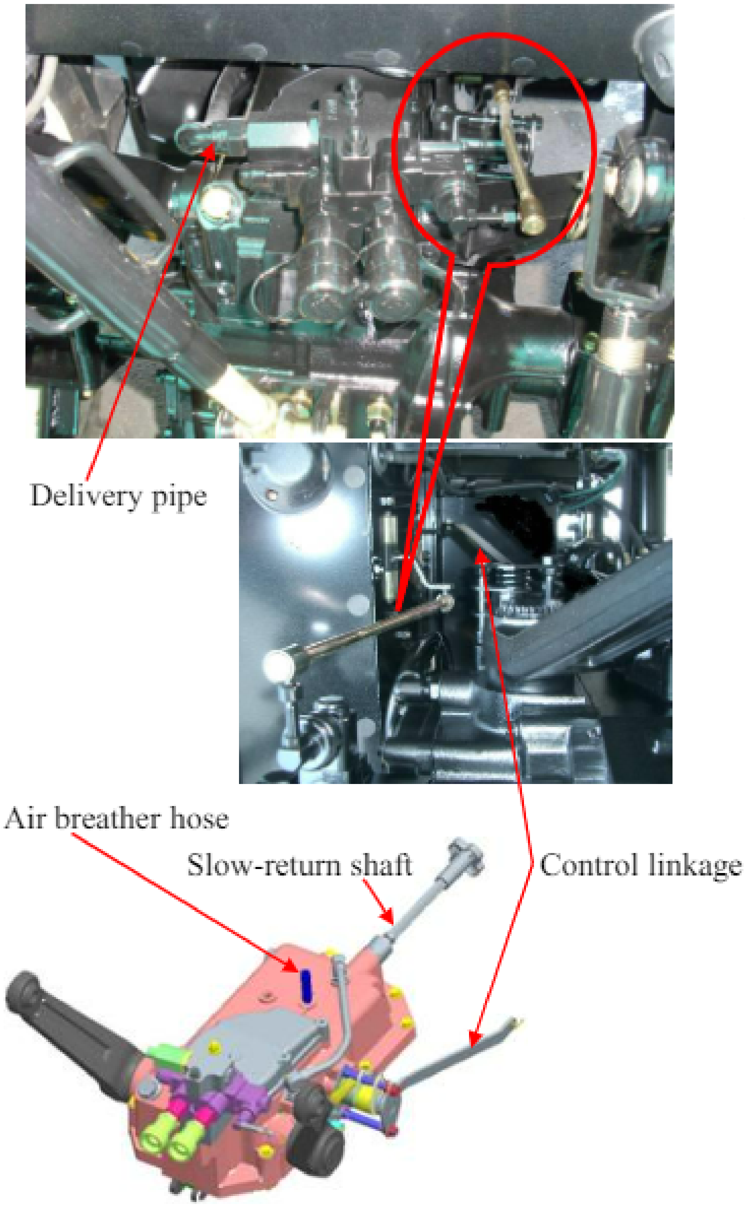


Fig.2-63 The state under removal

3) Remove the Cylinder case tightening bolts.
4) Detach the cylinder case assembly from the rear transmission

(2) Installation

Reassemble in reverse order of disassembly.

1) Tighten the cylinder case on the rear transmission case to the specified torque.

Tightening torque	550~700 Kgf-cm (40.5~51.6 lb.fts)

Note : The contact surfaces should be cleaned. Apply adhesive (THREE BOND 1215) on the contact surface of rear transmission ahead of time.

2) After reassembly, make sure that the system functions properly.

Chapter 3
ENGINE ACCESSORIES

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Chapter 3.Engine accessories

SECTION 1. RADIATOR

1.General description

The pressure cooling system includes mainly the radiator, water pump, multi-blade fan, and the thermostat. During the warm-up period, the thermostat remains closed and coolant is directed through by-pass to the suction side of the water pump.

Coolant then circulates through the cylinder block and water pump only to provide a uniform and fast warm-up period. Once the engine has reached operating temperature, the thermostat opens and coolant is pumped from the bottom of the radiator via the lower hose into the cylinder block. Here it circulates through the block and around the cylinders.

From the cylinder block, coolant is directed through the cylinder head and into the thermostat housing. With the thermostat open, coolant passes through the housing and upper radiator hose into the top of the radiator where it is circulated to dissipate heat.

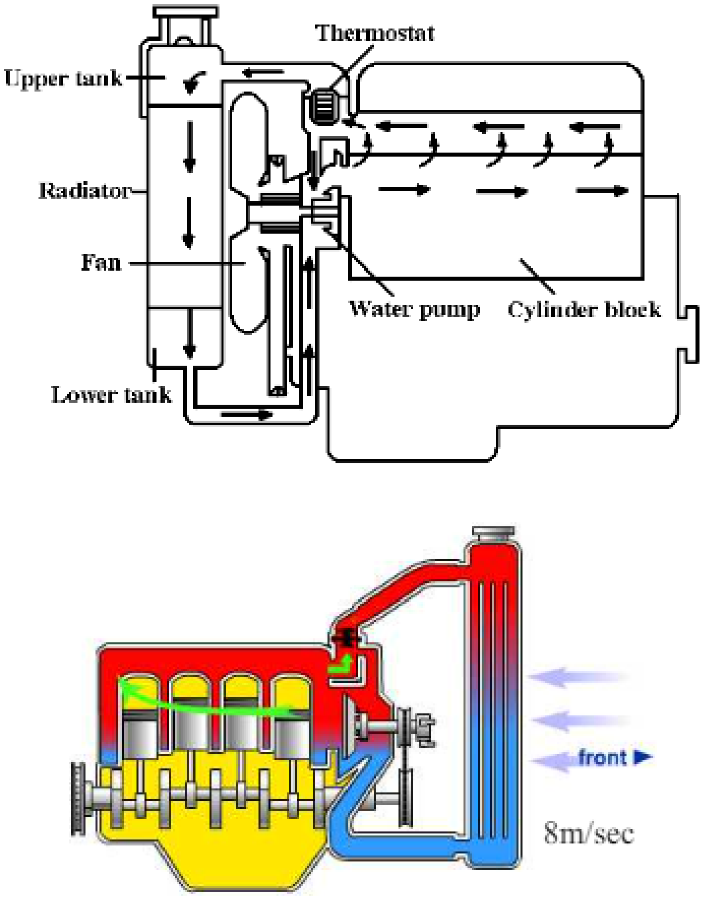


Fig.3-1

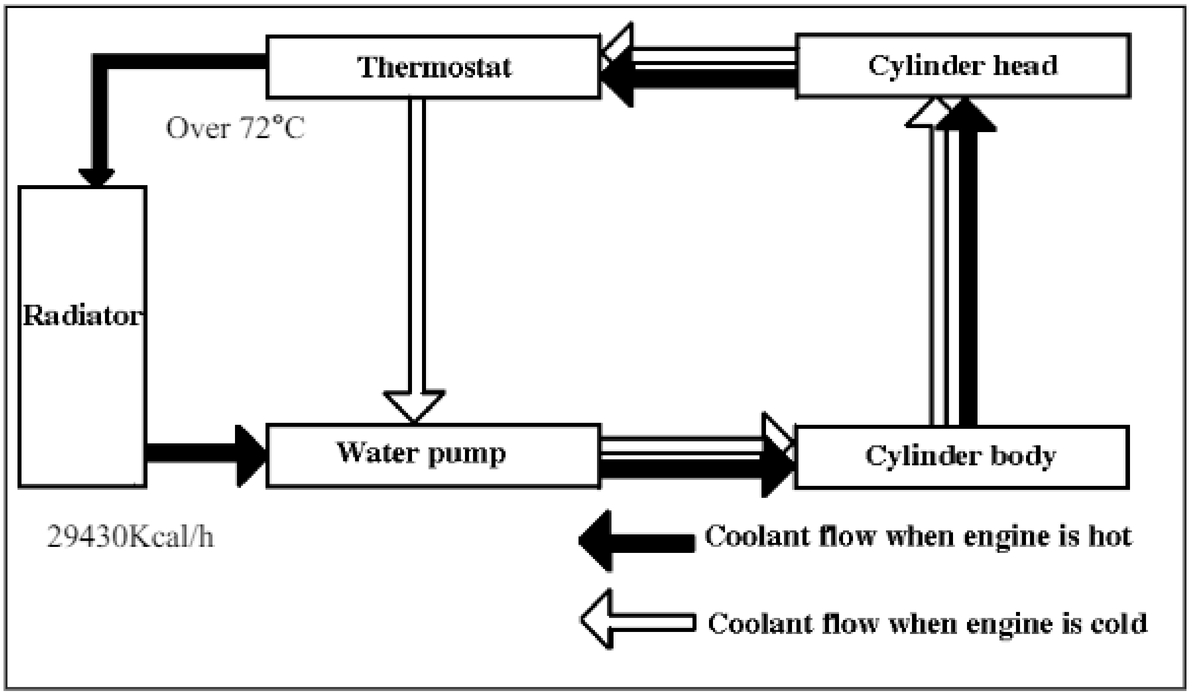


Fig.3-2

2. Radiator

The radiator consists of radiator cores, a tank to flow coolant, side plates to install the radiator, and a fan guide. Fin-tube type cores are used and the cores and tank is made of anti corrosive aluminum and aluminum alloy.

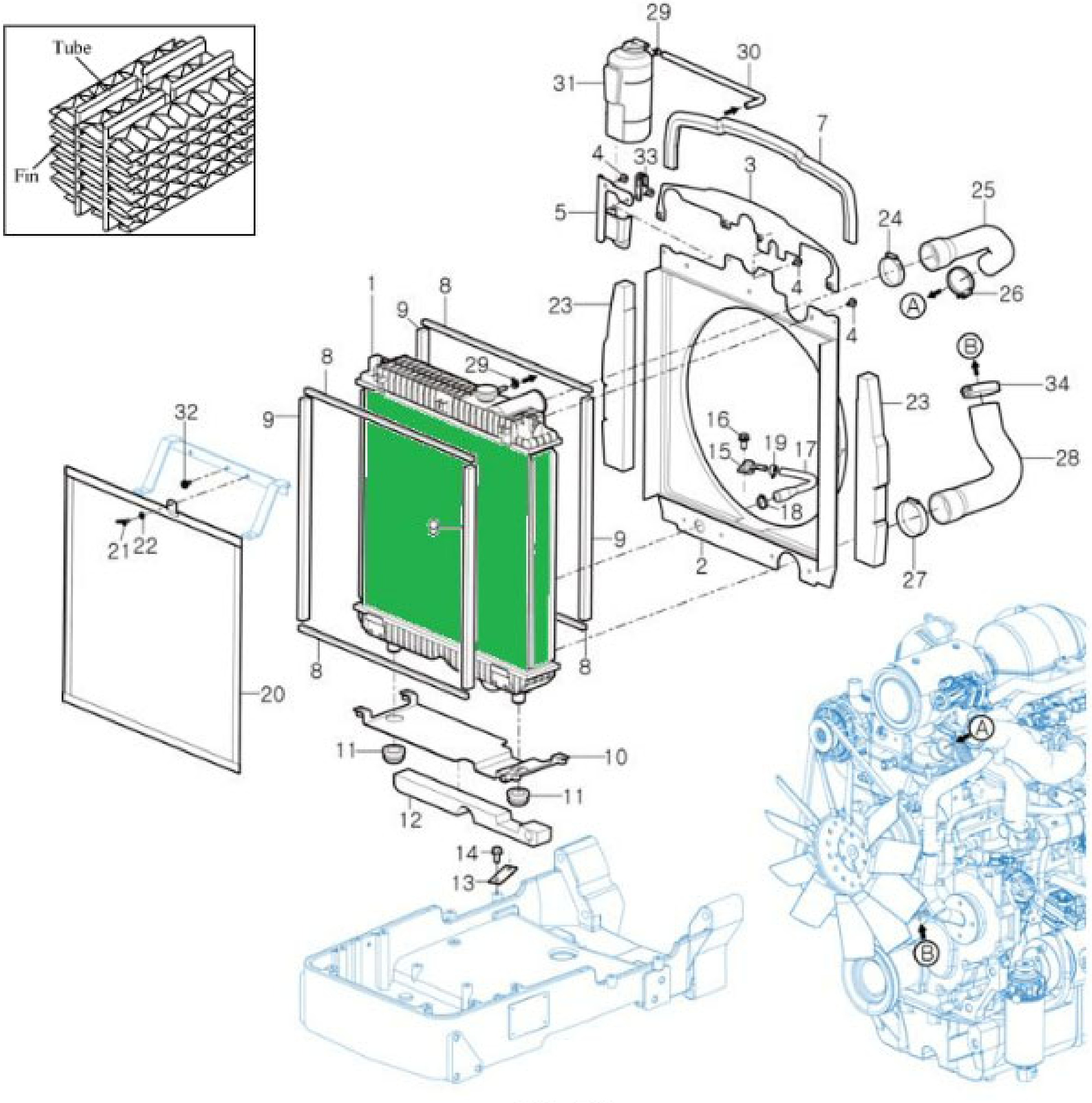


Fig.3-3

1.Radiator Assy 2.Shroud 3.Plate Comp, Seal A 4.Bolt, Hex/SPL 5.Plate Comp, Reservoir 6.Insulator, Radiator/A 8.Sponge(495) 9.Sponge 20X15 10.Support Comp, Radiator 11.Cushion Radiator 12.Insulator, Low/Radiator 13.Plate Comp, Connector 14.Bolt, Hex/SP 15. Connector Assy 16.Bolt, Hex/SP 17.Hose(210) 18.Band Clamp 22 19. Band Clamp 18 20. Net Comp, Radiator 21.Bolt, Wing 22.Washer, Plain 23.Insulator, Side 24.Band Clamp 64 25.Hose, Rad Inlet 26.Wire Clamp 48 27.Band Clam 75 28.Hose, Rad Outlet 29.Clip, Hose D=12.5 30.Hose, 420 31.Tank Assy, Reservoir 32.Bolt, Hex/SP 33.Claim, 9 34.Band Clamp 64

3. SPECIFICATIONS

Description	2655 HST
Radiator core type	Wave Fin
Core train number	4 trains
Radiator fin pitch	2 mm
Thermal radiator area	17.2276㎡
Pressure valve opening pressure	0.9 ± 0.15Kgf/㎠
Coolant capacity	8.5 ℓ
Test pressure	1.5 Kgf/㎠(21.3 psi)

4. REMOVAL OF THE RADIATOR

1) Release the clamp and remove the upper hose.

2) Release the clamp and remove the lower hose.

3) Release the hose clamp and remove the water drain hose.

Note:

- The water coolant should be drained from the drain plug on the bottom of the radiator ahead of time.
- When removing the radiator, take care not to damage the radiator cores and oil cooler.

5. INSPECTION OF EACH PART

1) Inspection for radiator water leaks.

Water leaks are liable to occur at the fitting portion between the upper tank and the core section or between the lower tank and the core section. If any water leak should occur there, repair the leak by soldering. Besides making a visual check, a more complete inspection should be accomplished as follows:

a. Leak test with compressed air.

Place the radiator as shown in the figure. Close the openings for water inlet and with something like a rubber plug and apply compressed air(1㎏f/㎠ or 14.2psi) through the drain pipe into the radiator. Excessively compressed air may damage the cores, so perform the air delivery carefully, watching the pressure gauge. Water leaks are inspected by watching for rising air bubbles.

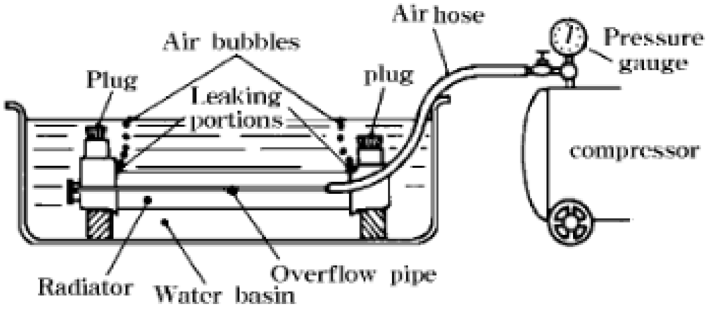


Fig.3-4

b. Leak test with a radiator cap tester

With the inlet and outlet pipes plugged up and the radiator filled with water, replace radiator cap with a radiator cap tester as shown in the figure.

Pump up the pressure in the radiator to the specified value and check to see if there are any leaks in the radiator.

When the radiator is water-tight, the pressure indicated on the pressure gauge does not increase, but if there are leaks, the pressure decreases. This tester is also applicable for leak tests for the whole cooling system, not only for the radiator. The test method is the same as mentioned above.

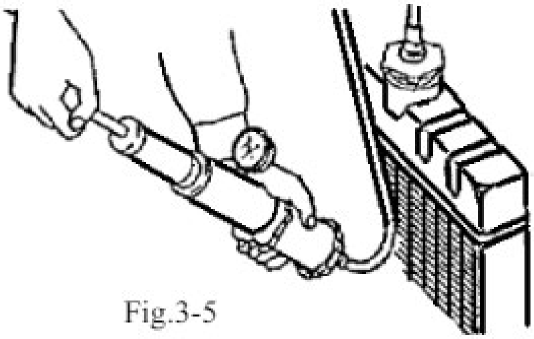


Fig.3-5

Testing Pressure	1.5 Kg /㎠

2) Inspection for radiator clogging

To inspect the radiator cores to see if they are clogged with fur or rust, remove the radiator cap and check for transparency of the coolant, and for rust or fur formation around the radiator throat inside the radiator.

If some rust or fur has formed or the coolant transparency is very poor, the radiator should be cleaned.

a. Cleaning the radiator inside.

-Place the radiator upside down and supply pressurized water from a faucet to the lower tank, draining through the upper tank, as shown in the figure to wash out accumulated deposits.

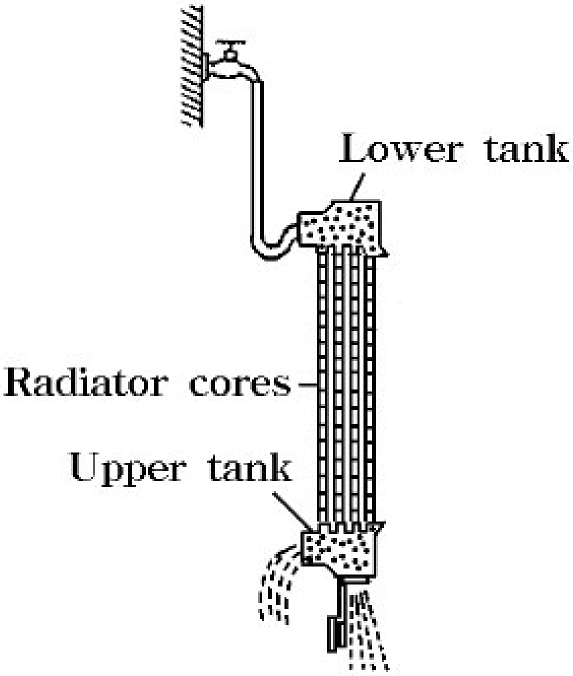


Fig.3-6

-Clean with a detergent

When cleaning the radiator with a detergent, follow the instructions given by its manufacturer.

Different detergents have different characteristics.

b. Cleaning the radiator exterior

- Cleaning the net (wire mesh)

After the tractor has been operated in dusty conditions, check the net daily and clean it if necessary.

-Cleaning the radiator cores

Clean the radiator cores by applying water spray or compressed air so as to for a right angle with the radiator cores, moving water application in parallel.

Note:

When cleaning the radiator cores with pressurized water, be sure to apply it at a right angle to the cores. Slanted application might deform their cooling fins.

3) Visual inspection of the exterior parts

When the radiator exterior is corroded, cracked, or badly damaged, replace the radiator.

Also replace damaged or fatigued water hoses.

Retighten loose hose clamps securely if water is leaking through the hose clamps securely, or replace them if necessary.

4) Inspection of the radiator cap.

Check the radiator cap to see if it functions normally, using a radiator cap tester as following.

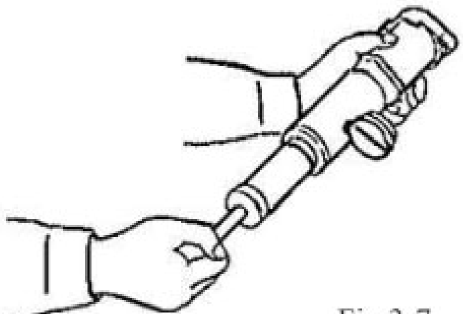


Fig.3-7

Pressure valve Opening pressure	0.9 Kg / ㎠ (12.79 psi)
Vacuum valve Opening pressure	0.04 ~ 0.05 Kg / ㎠ (0.57 ~ 0.71psi)

-Function test:

The pressure type radiator cap has a pressure valve and a vacuum as shown in the figure.

Both valves are held against there seats by springs while the pressure in the cooling system remains within a specified range, thus keeping the cooling system air-tight.

When the pressure in the radiator rises higher than the specified valves, it overcomes the force of the pressure valve spring and open the pressure valve to release excess pressure through the overflow pipe as shown in the figure.

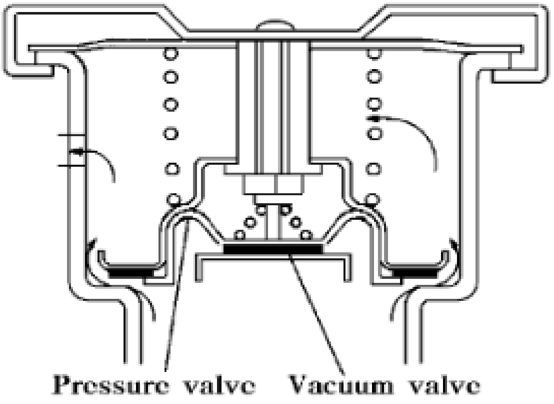


Fig.3-8

When the coolant temperature falls enough to cause the vapor to condense in the cooling system and decrease the coolant volume the radiator pressure becomes negative. When this occurs, the vacuum valve opens to let outside air into the radiator as shown in the figure, thus preventing the radiator from being deformed.

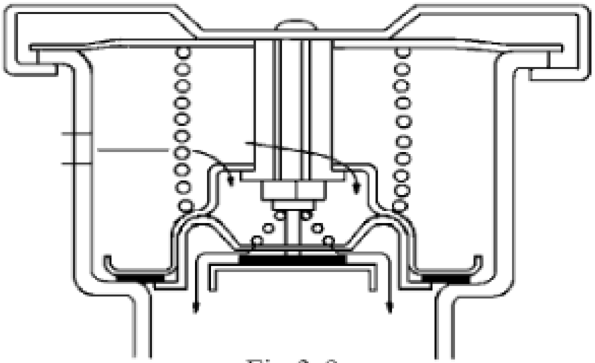


Fig.3-9

6. RADIATOR REASSEMBLY

Reassemble the radiator in the reverse order of disassembly.

Note : The rubber hoses should be clamped securely and must not interfere with the cooling fan.

The radiator cores must not interfere with the cooling fan.

When reassembling the radiator, apply the adhesive on the insulator(15) in Fig. 3-3 after the wiring harness is installed.

7. DAILY INSPECTION

1) Coolant level inspection and coolant replacement

When the radiator is hot after operation, be sure to wait until the coolant cools down sufficiently before removing the radiator cap.

If this is not done, heated vapor might burst out and cause burns. Use fresh water from a faucet as the coolant. When the coolant is replenished or changed, let the engine idle for a while for the coolant to circulate sufficiently in the cooling system and replenish if necessary after stopping the engine.

2)Antifreeze

When The weather is cold, use an antifreeze to prevent the engine from freezing. The freezing point differs according to the mixture ration of water and antifreeze. Therefore prepare an antifreeze solution which will have a freezing point 5℃ lower than the estimated lowest atmospheric temperature in your environment.

Precaution for filling antifreeze.

- The radiator interior should be washed clean ahead of time.
- As concerns of mixing ratio of an antifreeze, follow its manufacture's instructions.
- Antifreeze should be blended well with water before filling.
- When the coolant level is lowered due to evaporation, maintain the level by adding water, not by using an antifreeze solution.
- When the coolant level is lowered due to leaks, maintain the level by adding an antifreeze solution of the same mixing ratio.
- As antifreeze corrodes point, take care not to spill it on painted parts.
- The tractor is filled with a permanent type antifreeze (Mobile Long Life Coolant) when shipping (mixing ratio : 50%)

8. TROUBLE SHOOTING

TABLE 3-1

Problems	Causes	Countermeasures
1) Overheating	(1) Low coolant level	(1)Replenish coolant and inspect water leaks.
	(2) Fatigued pressure valve spring	(2)Replace radiator cap.
	(3) Loose or broken fan belt	(3)Adjust belt tension or replace.
	(4) Oily fan belt	(4)Replace.
	(5) Poor thermostat	(5)Replace.
	(6) Poor water pump or water leaks	(6)Repair or replace.
	(7) Clogged water passages	(7)Clean radiator and water passages.
	(8) Improper injection timing	(8) Adjust injection timing.
	(9) Clogged air ways	(9) Clean radiator exterior.
	(10) Fuel gas enters water jacket due to broken cylinder gasket	(10) Inspect cylinder head and replace cylinder gasket
2) Overcooling	(1) Poor thermostat	(1)Replace
	(2) Excessive low atmospheric temperature	(2) Decrease radiator working area by radiator masking.
3)Lose of coolant	(1) Leaking radiator	(1)Repair or replace
	(2) Loosely clamped or broken water hose	(2)Retighten or replace
	(3) Fatigued pressure valve spring	(3)Replace radiator cap
	(4) Leaking water pump	(4)Repair or replace
	(5) Water leakage through cylinder head gasket	(5) Inspect cylinder head and replace gasket
	(6) Cracked cylinder head or body	(6)Replace
4) Noisy cooling fan	(1) Poor water pump bearing	(1)Replace
	(2) Loose or bent fan	(2)Retighten or replace
	(3) Unbalanced fan	(3)Replace.
	(4) Poor fan belt	(4)Replace.

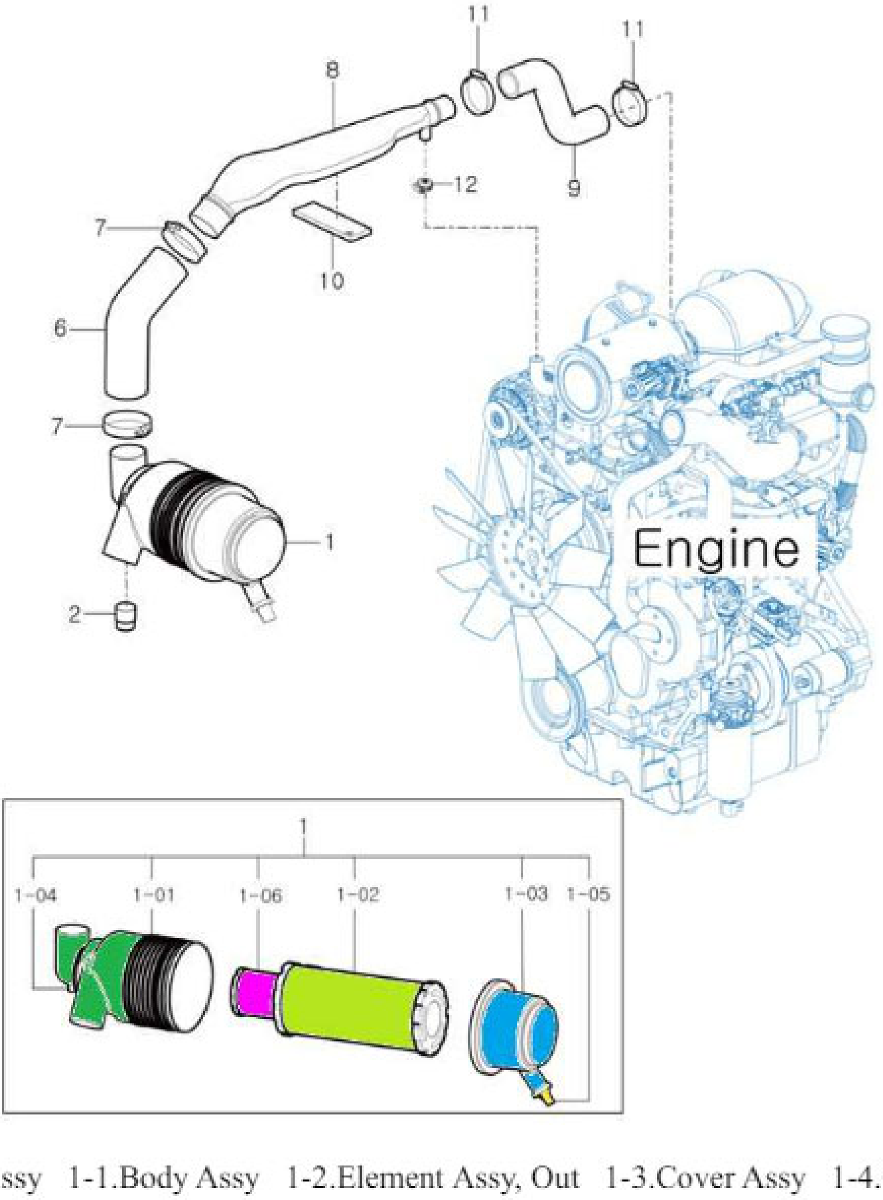
SECTION 2. AIR CLEANING SYSTEM

1. GENERAL DESCRIPTION

Unfiltered air contains many particles harmful to the engine such as dust ,sand or other foreign matter.

When such foreign matter have entered in to the engine. They have mixed into the lubricant and promote wear of lubrication parts in addition to damaging the piston cylinders. To eliminate these harmful particles, an air cleaner has been installed. The air cleaner which is installed on the tractor is a dry, cyclone type and is constructed as shown in the figure.

Under the influence of suction generated by the engine, unfiltered air flows through air inlet tube ① and is forced into a high-speed centrifugal motion. By this circulating action most of the dust and dirt particles are separated from the air and collected in the dust unloading valve (11). The remaining dust is removed as the air flows through the paper element (5) before being drawn into the engine.



1.Aircleaner Assy 1-1.Body Assy 1-2.Element Assy, Out 1-3.Cover Assy 1-4.Cap, Nipple
1-5.Vacuator Valve 1-6.Element Comp, In

Fig.3-10

2.ELEMENT AIR CLEANER

(1) SPECIFICATIONS.

Model		2655 HST
Type		Dry, paper element filtering type
Air venting resistance (㎜Aq)		120 or less
Cyclone efficiency (%)		45 or over
Total filtering efficiency(%)		99.9 or over
Filtering area (㎡)	Outer element	1.29±4%
	Inner element	0.26±4%
Filter material		Paper
Dust holding (g)		700 (at 650mmAg)
Applicable temperature range		-30~80°C

(2) DISASSEMBLY

1) Element removal

Unhook the 3 hooks of the Cover Assy(1-3) and open the Cover Assy, Pull out the Element Assy, Out(1-2) and Element Comp, In(1-6) one by one.

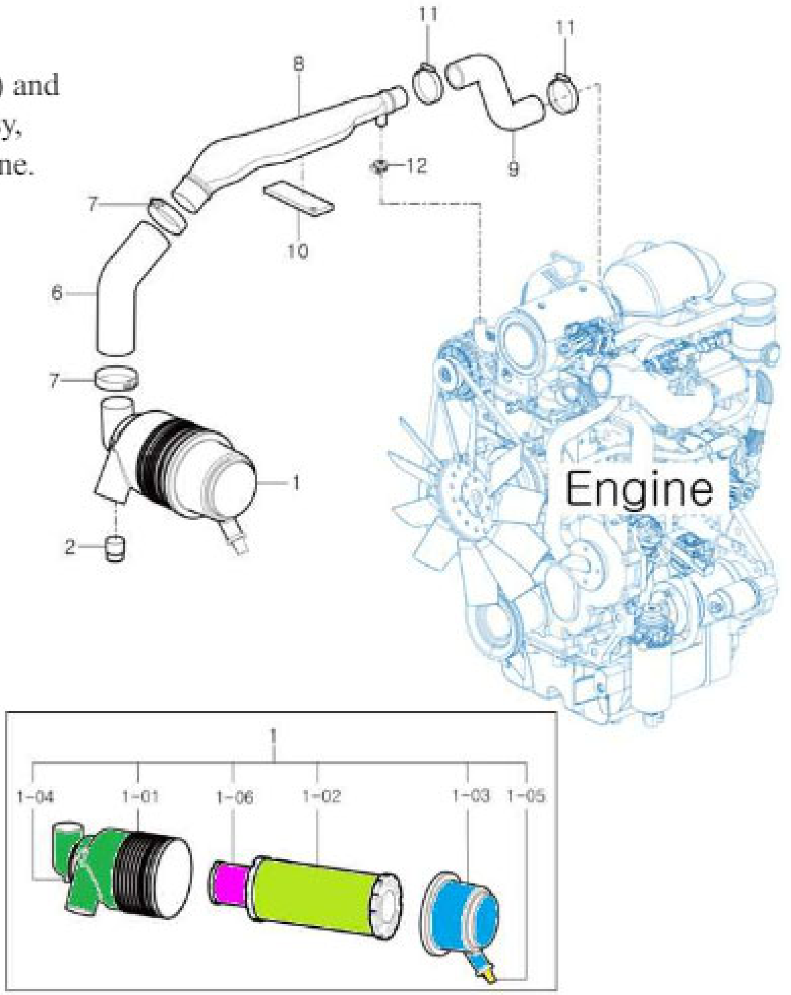


Fig.3-11

1.Aircleaner Assy
  1-1.Body Assy
  1-2.Element Assy, Out
  1-3.Cover Assy
  1-4.Cap, Nipple
  1-5.Vacuator Valve
  1-6.Element Comp, In
2.Indicator, REX770050 5kPa
3.Bracket Comp, Fix Air
4.Bolt, Hex/SP
5.Rubber Comp
6.Hose, A Inlet
7.Band Clamp 75
8.Duct, Air Inlet
9.Hose, B Inlet
10.Insulator, Radiator
11.Band Clamp 64
12.Band Clamp 32

3. INSPECTION OF EACH PART

1) Inspection of the cleaner body

(1) Check the cleaner exterior for cracks, deformation, or damage and repair or replace if necessary.

(2) Check each packing for fatigue or damage and replace if necessary.

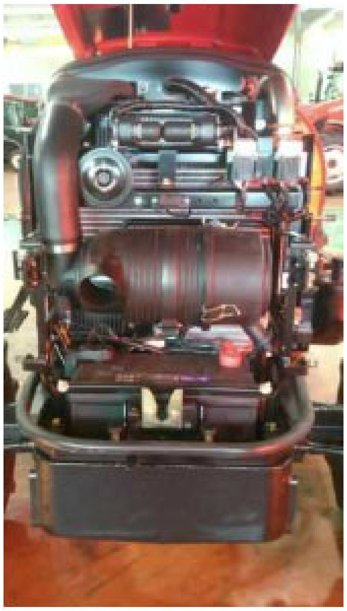


Fig.3-12

2) Inspection of rubber hoses

Check the rubber hoses for fatigue or damage and replace if necessary.

3) Inspection of the paper element

To check the element for damage, Dry it sufficiently after washing and put an electric bulb in to the element and look for damage.

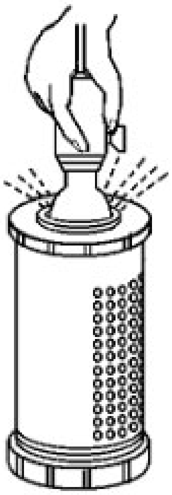


Fig.3-13 Element check

Note : Especially note the glue portions of the paper and metal parts.

4. CLEANING THE AIR CLEANER

Clean the air cleaner after 100 hours of operation or less depending on conditions in the following manner.

1) When the air cleaner is cleaned or the element is replaced ,dust accumulated inside the air cleaner body should be removed with a cloth. As inhaled dust causes engine wear, remove a dust accumulated inside the inlet pipe, the rubber hose which connects in the inlet pipe and the air cleaner, the inlet manifold, and inlet port.

(1) When accumulated dust is dry.

-When removing the dust in the element, hold the element by a hand and pat the side wall with other hand. Never hit the element against a stone or a concrete wall because that might cause its side wall to peel off.

- apply compressed air from inside of the element to blow dust off while turning the element by hand.

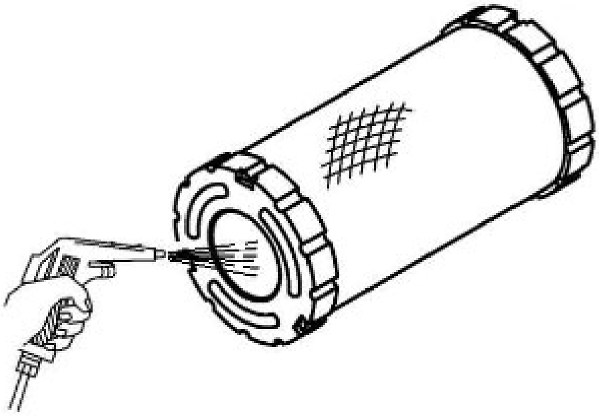


Fig.3-14 Element

Note : The compressed air to be applied should not have a pressure of more than 7kg/㎠ (99.6psi) Maintain sufficient distance between the air gun and the element.

(2) When accumulated dust is oily (Reference).

- Use a solution of TC 101 element detergent or the quality household neutral detergent. Leave the element in the solution for approximately 30 minutes and then wash it by dipping it in and out of the solution.

- After soaking, rise it in fresh water.
- Let it in a shaded and well ventilated place. Forced drying by heat or compressed air is prohibited.

Note : Water applied to rinse the element should not have a pressure of more than 2.8kgf/㎠ (39.8psi).

An element which has been washed 5 times must be replaced with a new one.

5.ELEMENT INSTALLATION

Install the element in the reverse order of disassembly, but follow these instructions.

1) Each tightening clamp must be secured and care must be taken not to miss the packing and washers.
2) Before installing the element, clean the rubber packing on the top of the element.

Note : The clamp retaining the element should be tightened sufficiently so that it will not become loose during operation.

CHAPTER 4
Clutch and HST system

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2. HST unit specification --- 4-2

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Chapter 4. Clutch and HST system

SECTION 1. GENERAL DESCRIPTION.

The damper flange is a device to engage the power of the engine. The construction of the damper is as shown in the figure. It is composed of the flywheel which holds the damper flange and input gear of the HST. The damper is held on the flywheel by the bolts. The damper which is mounted on the splined part of the input gear of the HST. It transmits engine power to the transmission through the HST by means of damper.

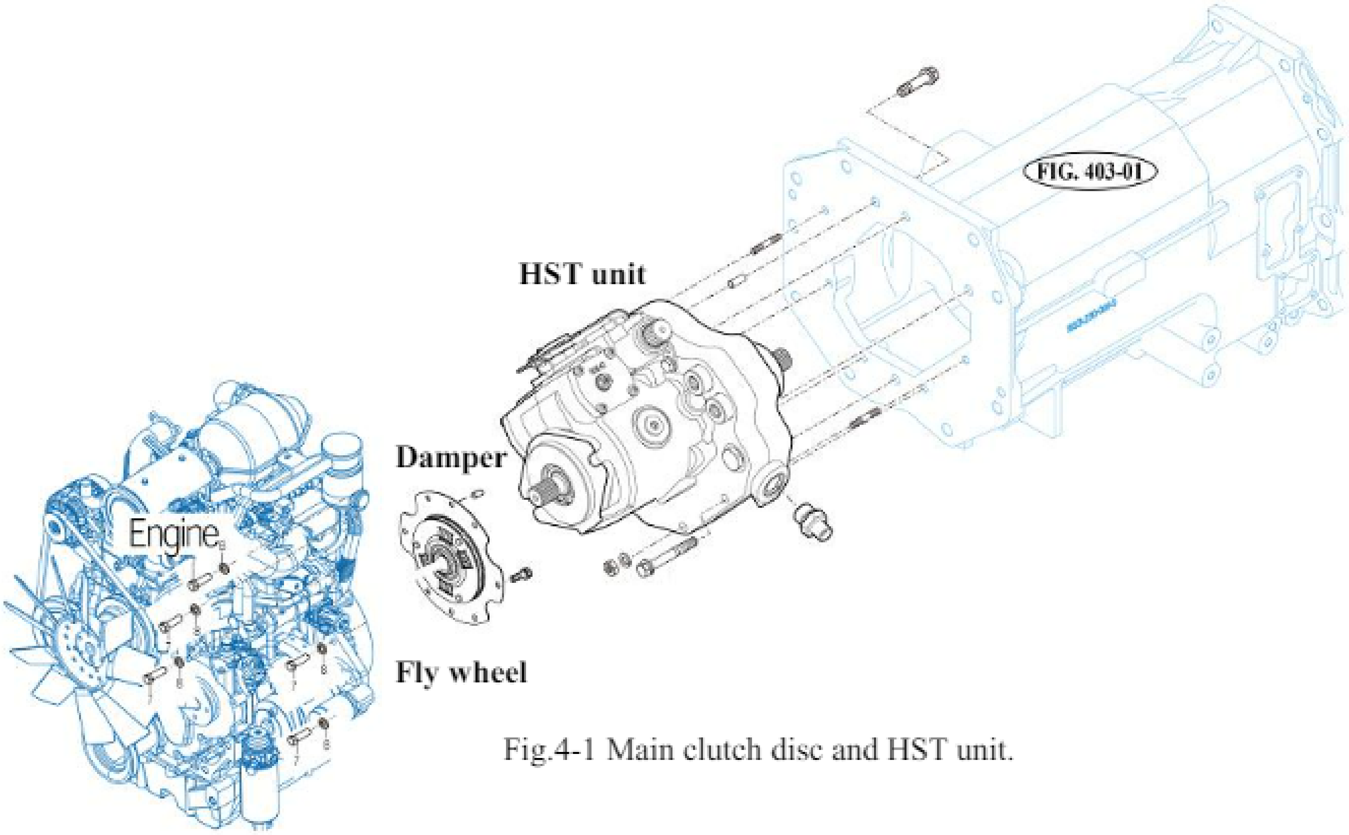


Fig.4-1 Main clutch disc and HST unit.

1. DAMPER SPECIFICATIONS

Table 4-1

Parts	Items	Description and assembly standard values
Hub splines	Number of teeth	15
	DP	16/32
	Standard pitch diameter	D23.8125
	Major diameter	D26.0604
	Minor diameter	D22.2758

2. HST UNIT SPECIFICATIONS

Manufacturer -- EATON
Model -- 77122-RAL-02

Pump Specification

Displacement (Servo controlled variable) -- 49.2 cm3/rev. (3.00 in3/rev)
Input shaft rotation -- Right hand rotation (CW)
Input shaft specification -- 15 tooth 16/32 external, diameter 24.98 mm
Input shaft extension -- 46 mm
Output shaft specification -- 13 tooth 16/32 external, diameter 21.81 mm
Output shaft Min. full depth -- 20.6 mm
Charge Type -- Remote Charge with flow Filtration
Charge Pump Relief valve setting -- 17.24 ~ 20.68 bar (250~300 lbf/in2)
Auxiliary port size and location -- No auxiliary port
Drain port size and location -- 0.750-16 UNF-2B SAE O-ring port (RH)
Drain plugged diameter -- 6.35mm
Relief valve setting for main port A -- 413.7 bar (6000 lbf/in2)
Relief valve setting for main port B -- 413.7 bar (6000 lbf/in2)
Control supply orifice (p) -- 0.91mm
Control servo orifice (s1 and s2) -- 0.91mm
Special control options – Control lever, position angle -- 180 degrees

Motor Specification

Displacement (Fixed displacement Axial type) -- 40.6㎤ /rev(2.48 in^3/rev)
Output shaft -- 15 tooth 16/32 spline, shaft extension 46 mm
Drain ports size and location -- Diameter 9.6mm top (housing)

Notes :

Unit ratings : Max. operating speed -- 3600 rpm
Max. continuous pressure -- 206.8 bar[3000 lbf/in2]
Max. surge pressure -- 441.3 bar[6400 lbf/in2]
Max. intermittent pressure -- 344.7 bar[5000 lbf/in2]
Max. closed loop temp -- 107 deg C[225 deg F]
Charge requirement -- 17.24-22.41 bar[250-325 lbf/in2]

SECTION 2. COMPONENT LOCATION

1. Hydraulic Hoses and lines.

A. Hydraulic oil cooler

B. Gear pump

C. Cooler return Line

D. Steering Control Unit

E. Hydrostatic Unit

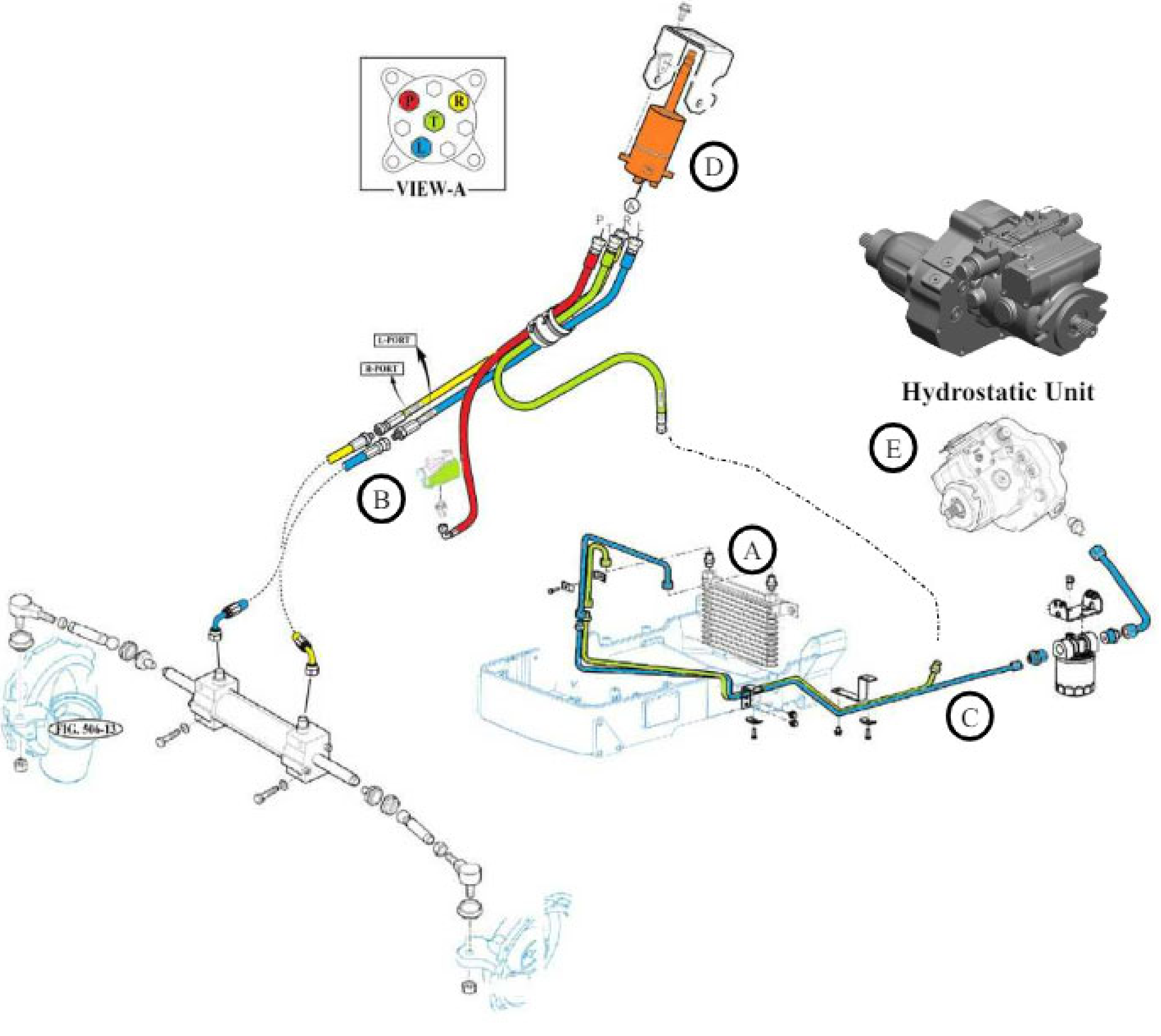


Fig.4-2 Hydraulic line and HST unit.

2. Hydrostatic transmission

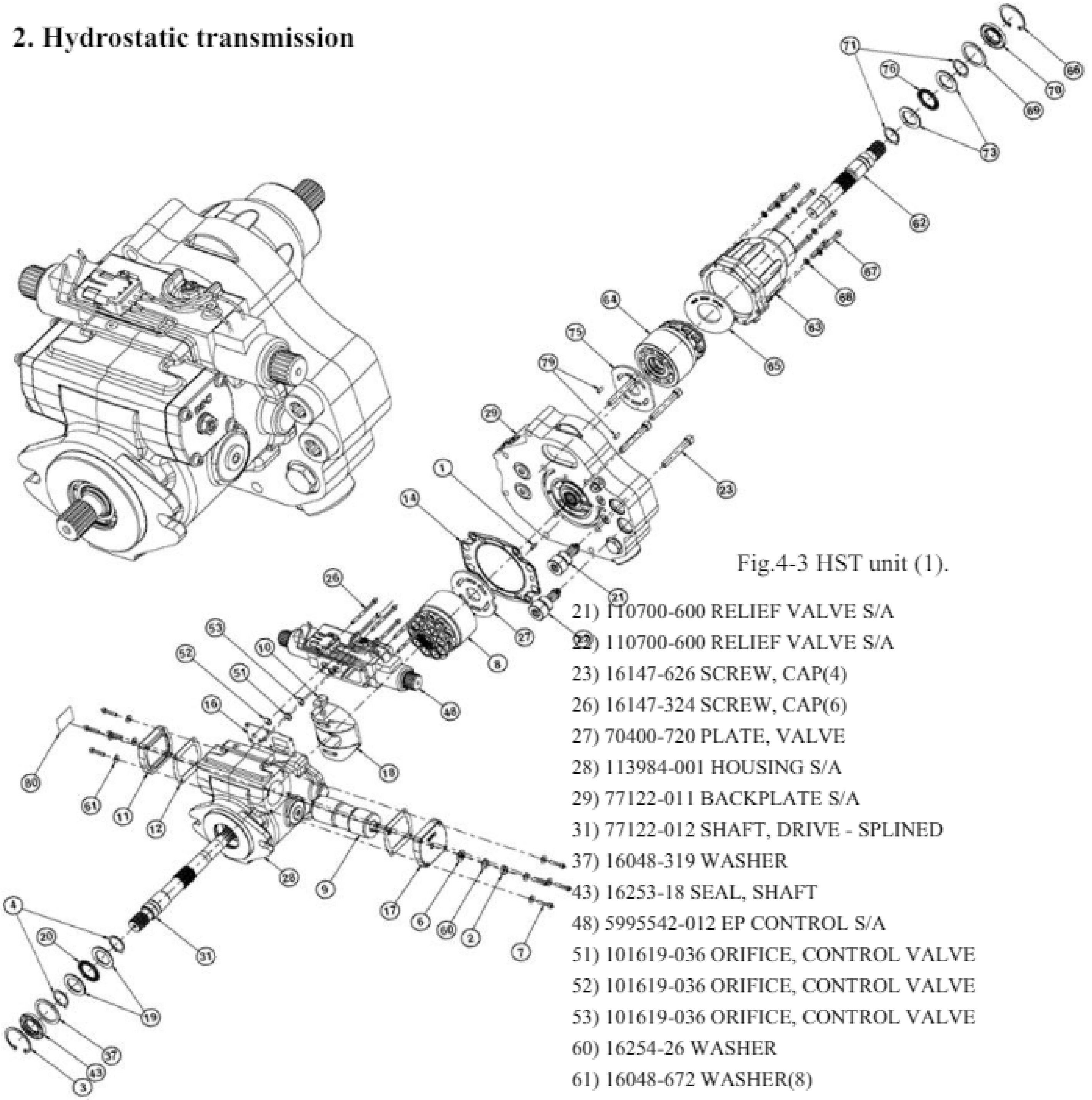


Fig.4-3 HST unit (1).

1) 16028-304 PIN, DOWEL
2) 16024-6 NUT, JAM
3) 16077-32 RING, RETAINING
4) 16078-18 RING, RETAINING(2)
6) 16254-6 WASHER, SEAL
7) 16147-310 SCREW, CAP(8)
8) 70400-737 ROTATING KIT S/A
9) 113684-001 SERVO PISTON S/A
10) 72400-585 FOLLOWER, SERVO PISTON
11) 72400-620 PLATE, COVER
12) 72400-621GASKET, COVER PLATE(2)
14) 72400-626 GASKET, HOUSING
16) 72400-631 GASKET, CONTROL HOUSING
17) 72400-651 PLATE, COVER
18) 72400-677 CAMPLATE S/A
19) 74308-100 RACE, THRUST(2)
20) 74308-101 BEARING, THRUST

21) 110700-600 RELIEF VALVE S/A
22) 110700-600 RELIEF VALVE S/A
23) 16147-626 SCREW, CAP(4)
26) 16147-324 SCREW, CAP(6)
27) 70400-720 PLATE, VALVE
28) 113984-001 HOUSING S/A
29) 77122-011 BACKPLATE S/A
31) 77122-012 SHAFT, DRIVE - SPLINED
37) 16048-319 WASHER
43) 16253-18 SEAL, SHAFT
48) 5995542-012 EP CONTROL S/A
51) 101619-036 ORIFICE, CONTROL VALVE
52) 101619-036 ORIFICE, CONTROL VALVE
53) 101619-036 ORIFICE, CONTROL VALVE
60) 16254-26 WASHER
61) 16048-672 WASHER(8)
62) 77122-006 SHAFT, DRIVE (MOTOR)
63) 114461-001 HOUSING ASSY (MOTOR)
64) 71402-621 ROTATING KIT ASSY (MOTOR)
65) 73400-605 INSERT, CAMPLATE
66) 16077-32 RING, RETAINING
67) 16147-414 CAP SCREW, HEX SOCKET HEAD(8)
68) 16048-36 WASHER(8)
69) 16048-319 WASHER
70) 16253-18 SEAL, SHAFT
71) 16078-18 RING, RETAINING(2)
73) 74308-100 RACE, THRUST(2)
75) 74308-053 VALVE PLATE
76) 74308-101 BEARING, THRUST
79) 16028-304 PIN, DOWEL(2)
80) 16334-001 LABEL, IDENTIFICATION, SELF-ADHESIVE / 16297-522 PLUG, SHIPPING, M22 PORT

3. Hydrostatic transmission (Main Pump Case)

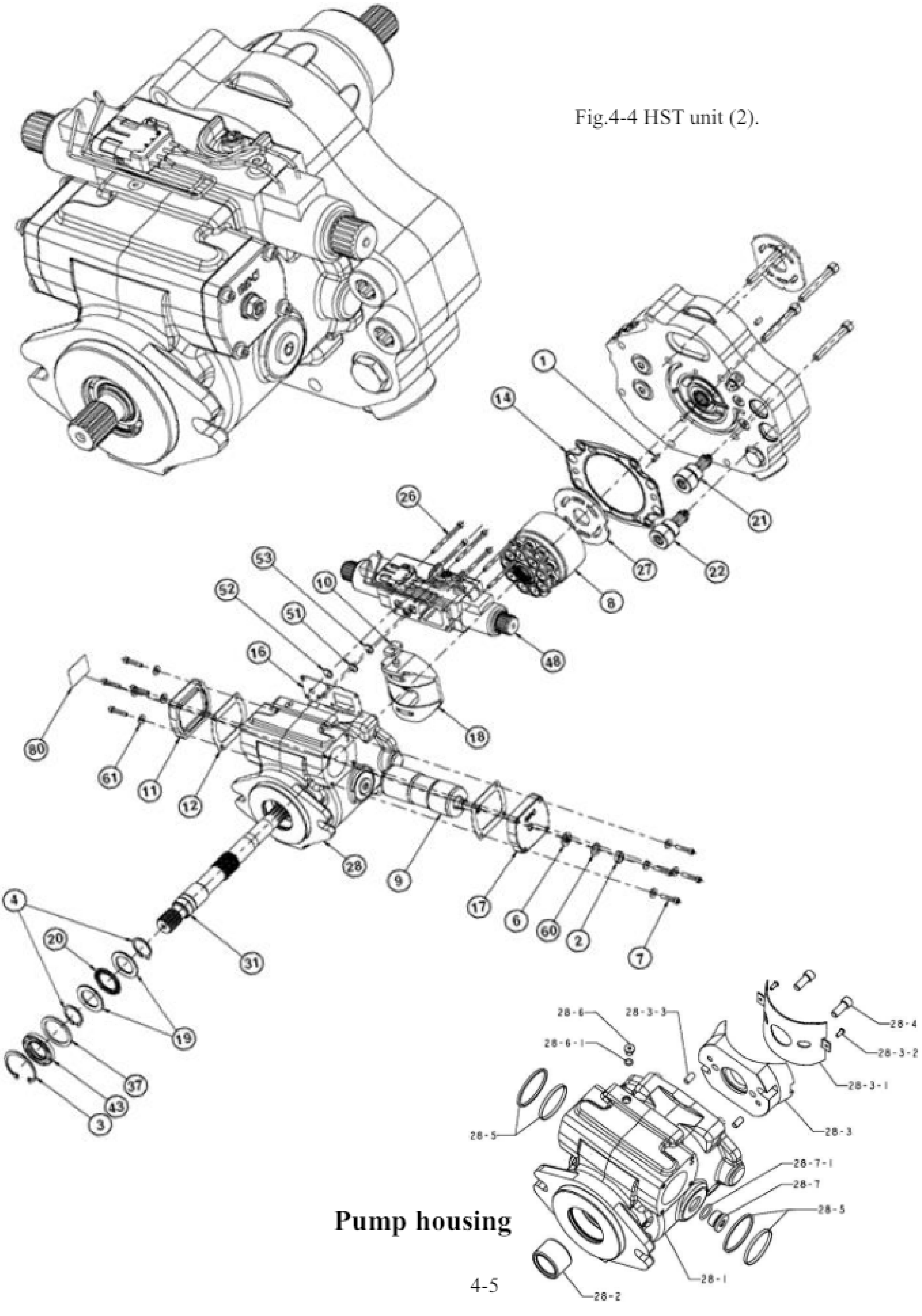


Fig.4-4 HST unit (2).

Pump housing

4. Transmission back plate and motor

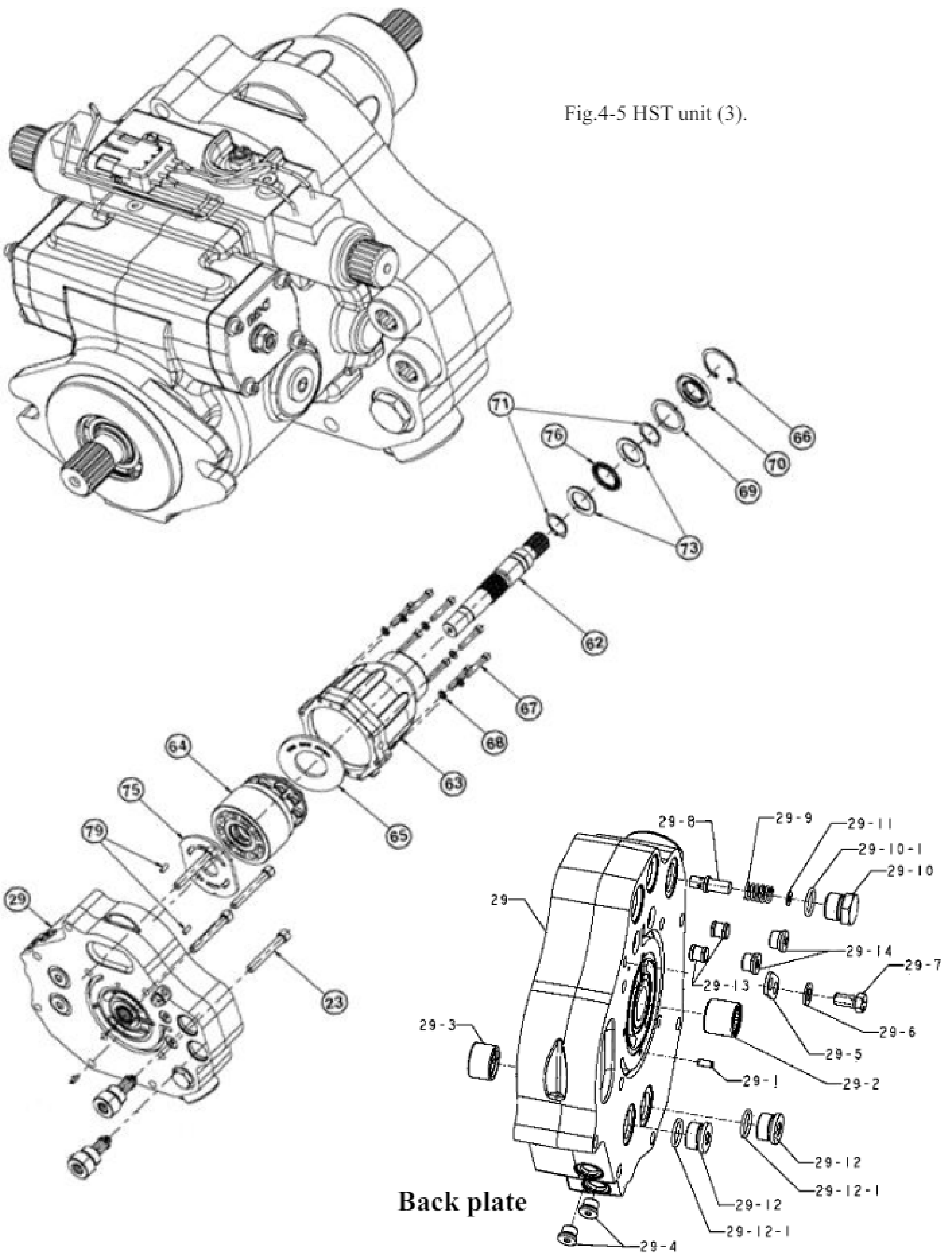
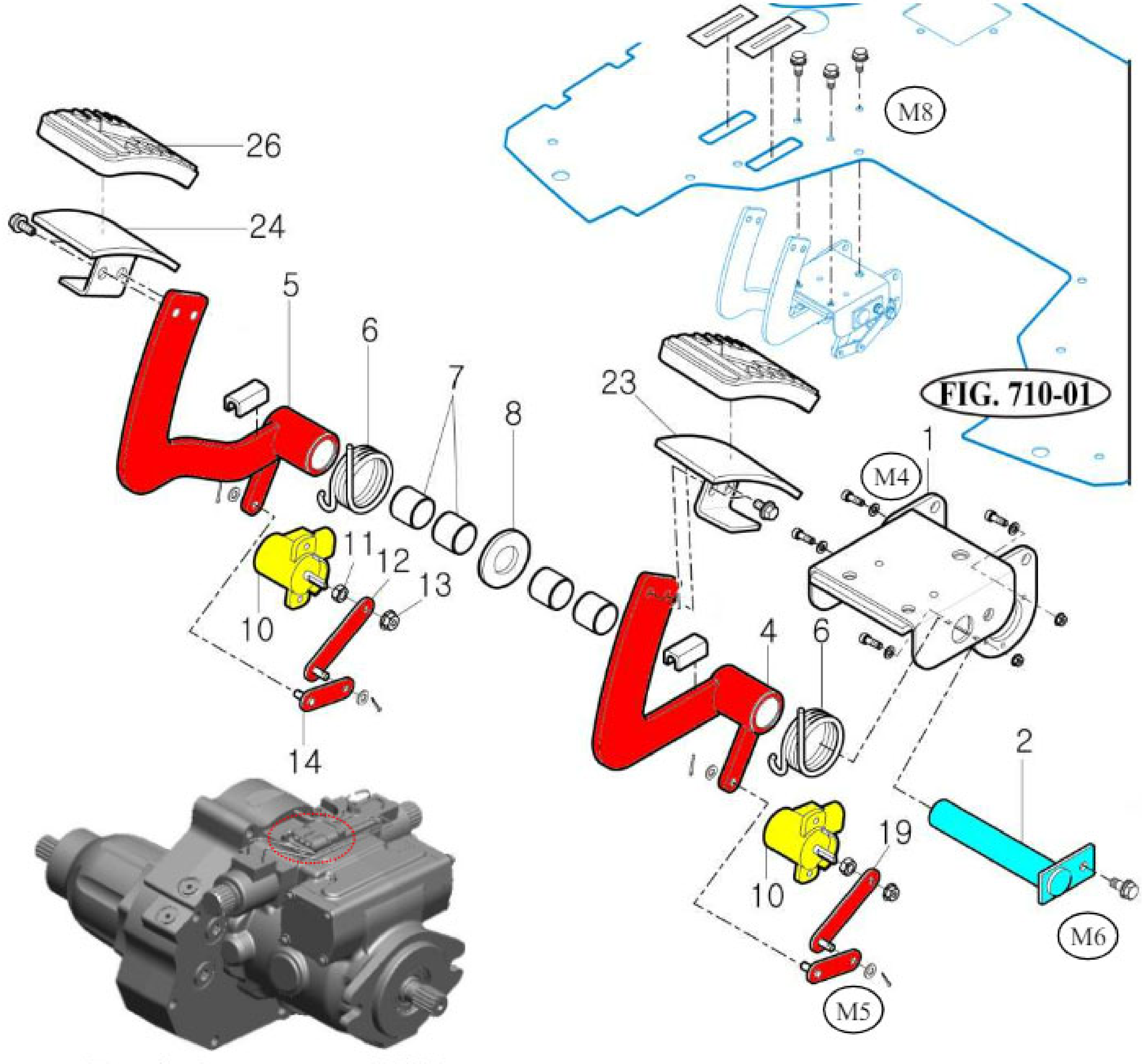


Fig.4-5 HST unit (3).

5. Hydrostatic control linkage and potentiometer



Terminal connector of HST

1) PLATE COMP , FIXED
2) ARM COMP , HST
4) PLATE COMP , FOR
5) PLATE COMP , REV
6) SPRING , TWIST(40)
7) BUSH , 20X23X208) PLATE
10) **POTENTIOMETER**
11) NUT , HEX NORMAL /2
12) LINK COMP , POTENTIOMETER(R)
13) NUT , HEX FLANGE
14) LINK COMP , 2
19) LINK COMP , POTENTIOMETER(F)
23) PEDAL COMP , FORW
24) PEDAL COMP , REV
26) PAD28) SEAL , PEDAL

Fig.4-6 Hydrostatic control linkage.

6-1. Hydrostatic system schematic

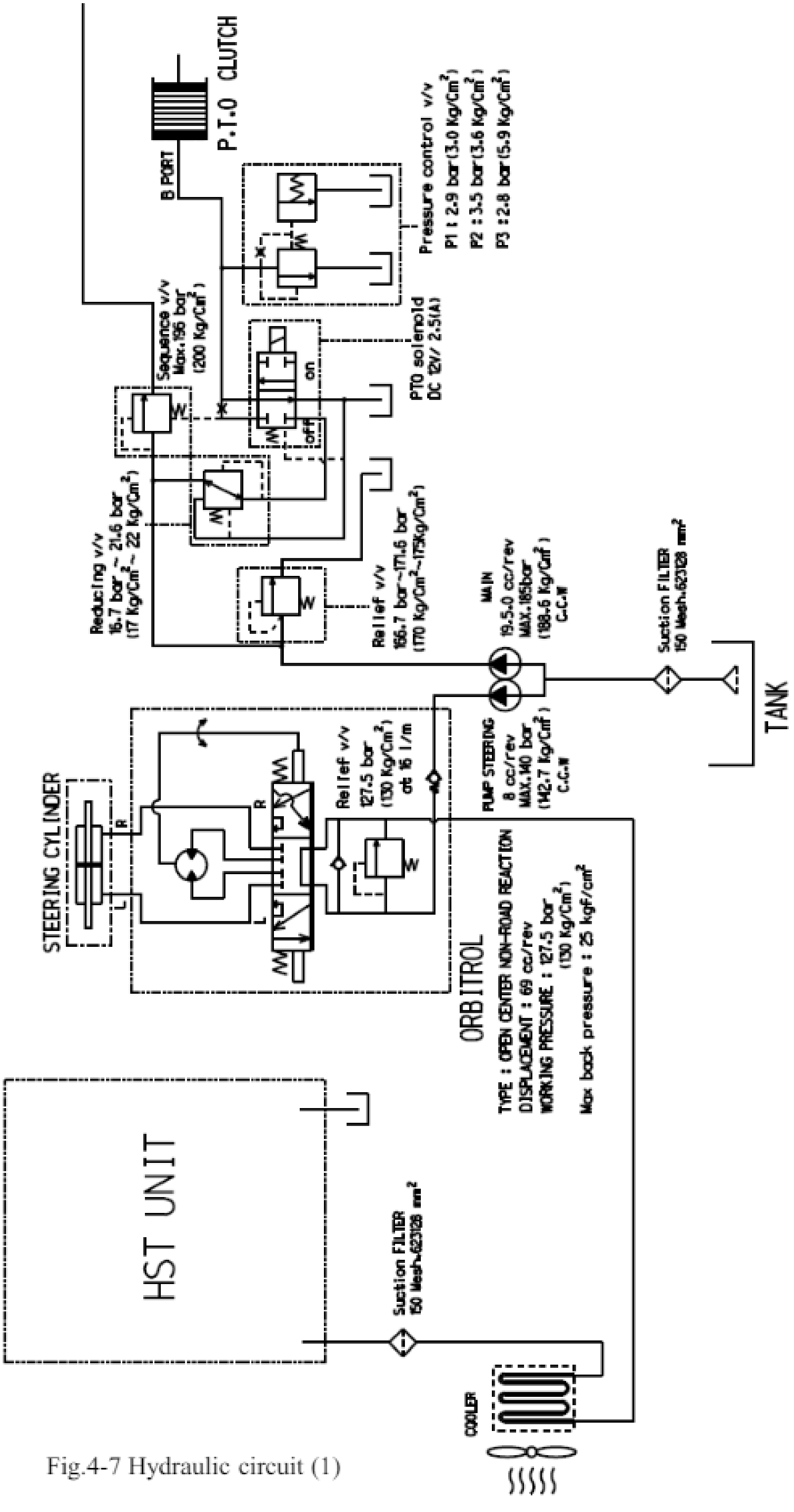


Fig.4-7 Hydraulic circuit (1)

6-2. Hydrostatic system schematic

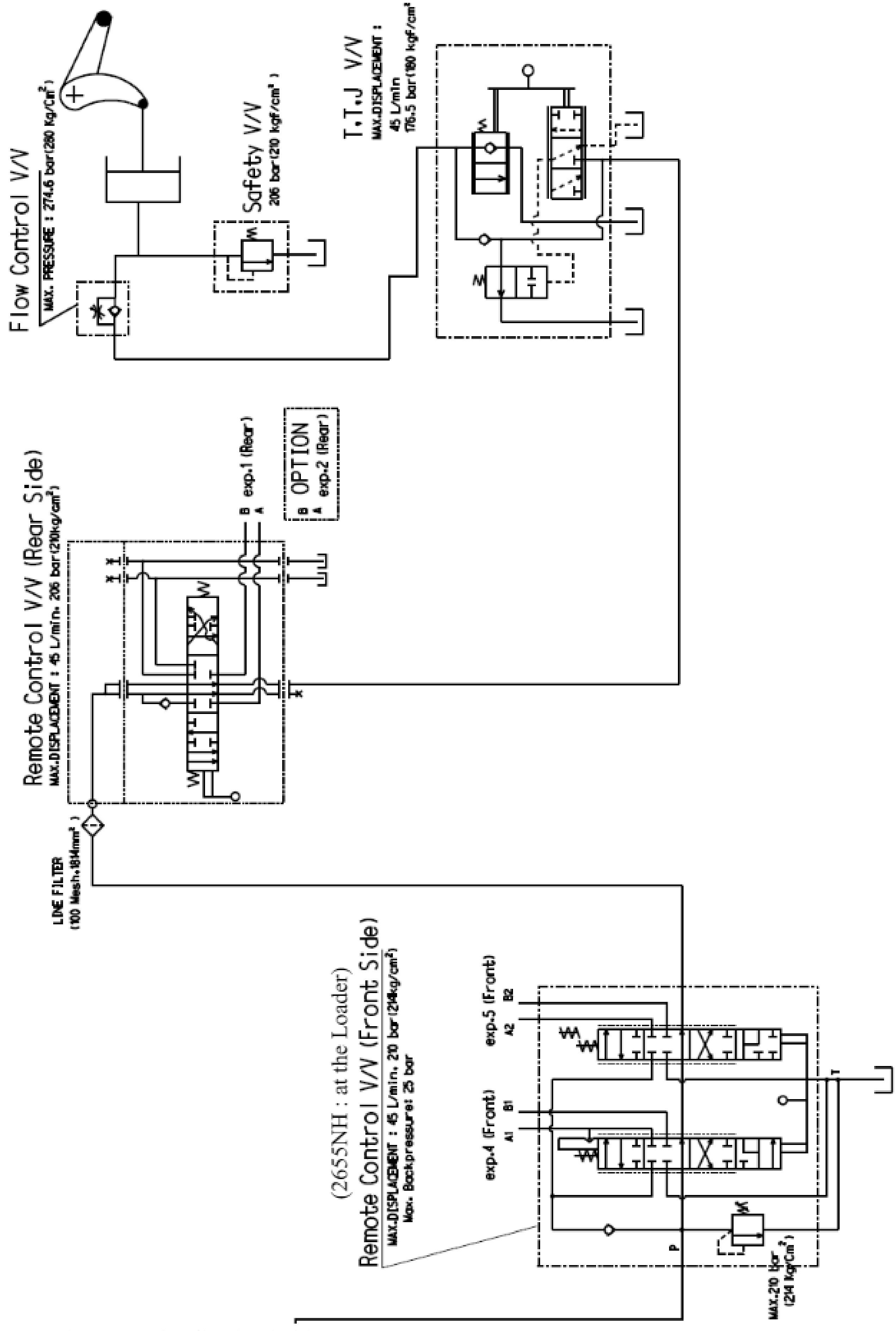


Fig.4-8 Hydraulic circuit (2)

SECTION 3. TROUBLESHOOTING

Problem or symptom ⇨ ⇩ Check or Solution	Wheels on machine will not rotate	Noisy pump or Motor	Sluggish response to changes in speed	Low power	Wheels rotate in one direction only	Tractor moves without pressing forward or reverse pedal	Tractor Does not Move when Forward or Reverse pedal are Pressed
Check flex plate coupling between engine and pump	•						
Hydraulic level low in transaxle	•		•	•			
Low charge pressure (see Tests and Adjustments Section)	•		•	•			
Main drive pressure relief valve stuck open (see Tests & Adjustments section)		•	•	•	•		
Air in system (see "HYDRAULIC SYSTEM BLEED PROCEDURE")		•	•	•			
Hydrostatic motor output pressure too low (see tests and Adjustments section)			•	•			
Internal pump or motor damage or excessive wear	•	•	•	•			
Parking brake engaged or malfunctioning	•	•					
Pump centering mechanism not properly adjusted			•		•	•	
Gear box malfunction (see gear power Train section)	•						
Servo valve malfunctioning	•		•		•		
Pedal neutral position Not properly Adjusted						•	
Hydrostatic Control linkage Worn out or Damaged or electrical system			•		•	•	•

Test conditions:

- Operator in seat
- Key switch in RUN position

Test / Check point	Normal	If Not normal
1. Control pedals	Pedal should move freely	Check linkage and electrical system with the potentiometer

Test conditions:

- Start engine and run at slow idle

Test / Check point	Normal	If Not normal
2. Directional pedals are in neutral position	Machine should not creep forward or backward	Adjust centering of pump control pedals and potentiometer
3.Move forwards or reverse pedal slowly from neutral to maximum travel speed position	Machine should accelerate smoothly forward or backwards.	Check fluid reservoir for proper fluid level. Check hydraulic tubing, and connections for leaks. Perform system flow and pressure checks to verify proper operation of charge pump and hydrostatic pump
4. Control pedal in full forward position	Machine should move forward	Check pedals and forward/reverse linkage for damage and electrical system Check forward drive pressure relief valve
5. Control pedal in full reverse position	Machine should move backward	Check pedals and forward/reverse linkage for damage and electrical system. Check reverse drive pressure relief valve.

SECTION 5. THEORY OF OPERATION

1. HYDROSTATIC SYSTEM

Function:

The hydrostatic system provides a means to transfer power from the engine to the final drive of the wheels. It also provides infinitely variable speed control, forward or reverse, by foot pedal operation.

Principles of Operation:

The hydrostatic system is a closed loop fluid power system that consists of an EATON piston pump/motor assembly, which is driven by a damper assembly attached to the flywheel.
Fluid flow is controlled by changing the angle of the cam plate in HST unit. This angle is controlled by the servo control spool valve and piston through F/R pedals with the electrical system.
Moving the respective directional pedal will move the spool off center, which controls the position of the cam plate.
The location, off center, of the cam plate controls the distance, the pistons travel inside the piston bore of rotating assembly. The direction that the cam plate is rotated from center determines the direction of fluid flow (forward or reverse). The number of degrees the cam plate is deflected, determines how much fluid will be displaced (speed).

The hydrostatic pump provides hydraulic fluid to the hydrostatic motor through the back plate. Hydraulic fluid in the power train circulates in a closed loop. Fluid leaves the hydrostatic pump and flows through the hydrostatic motor and is returned to the hydrostatic pump, not the reservoir. Fluid that leaves this closed loop circuit, such as case drain, is replenished by fluid from the charge pump.

Charge pump

The charge pump is a gear type positive displacement pump mounted to the right front side of the engine.
This pump provides pressurized fluid to the SCU (Steering Control Unit). Return oil from the SCU is routed through the filter under left floor panel and then into the hydrostatic pump to operate the servo control, and to provide replacement fluid to the hydrostatic pump.

Hydrostatic Motor

The hydrostatic motor is an EATON high torque axial piston motor. The motor is located on the rear of the back plate. The hydrostatic motor drives a shaft for a three speed range gear transmission which transfers power to the wheels. (See Final Drive Section)

SECTION 6. TESTS AND ADJUSTMENT

1. HYDROSTATIC PEDAL AND NEUTRAL ADJUSTMENT

Reason:
To ensure that tractor does not move unless forward or reverse pedal is depressed.

Procedure:

1. Operate the hydrostatic control pedals. They should return by themselves to the neutral position. If pedals do not operate properly, check the linkage of the pedals and potentiometer for damage or wear
2. Start engine and run at low idle.
3. Place the Sub shift lever in LOW gear. Tractor should not move. If tractor moves, note direction, and adjust the neutral position of potentiometer as follows:

⚠ CAUTION

SEVERE INJURY OR DEATH CAN RESULT IF ENGINE IS NOT SHUT OFF WHEN PERFORMING NEUTRAL ADJUSTMENT

4. Shut engine OFF, engage park brake.

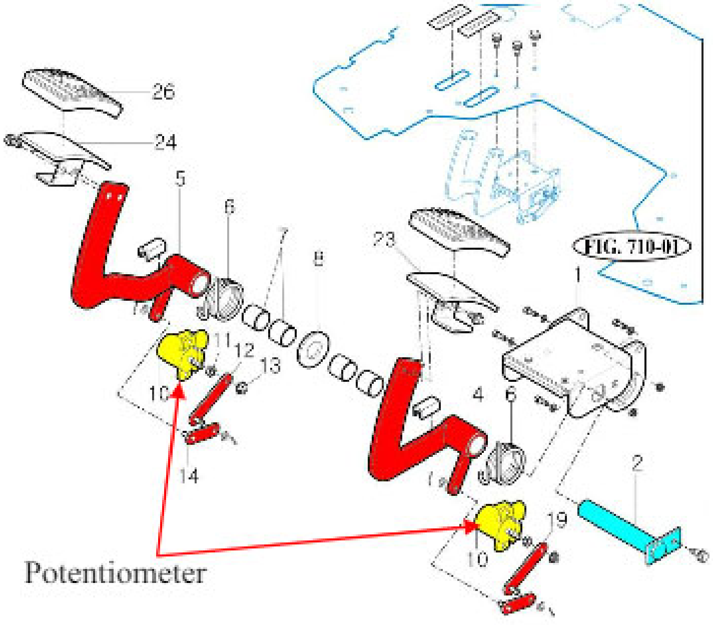


Fig.4-9 Potentiometer

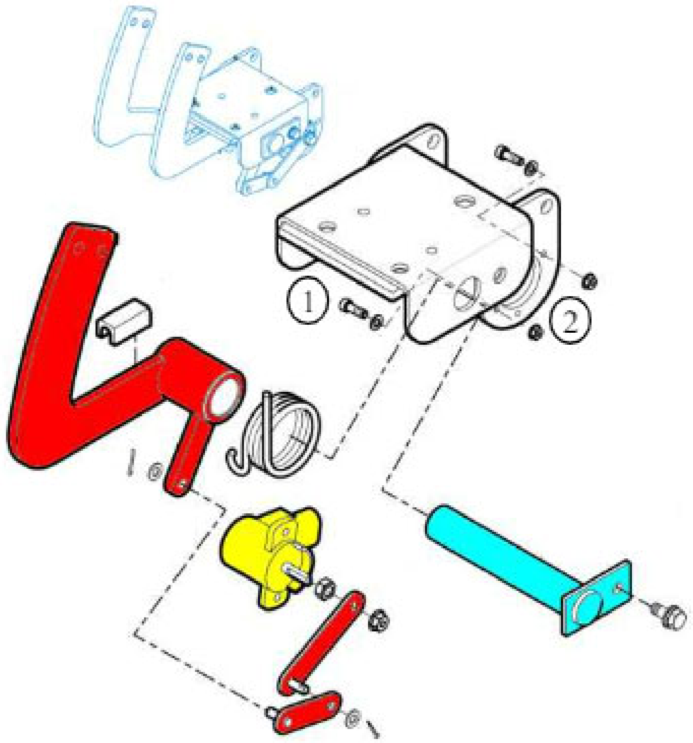


Fig.4-10 Potentiometer and linkage

5. On the right side of the tractor, below the forward and reverse control pedals, locate the potentiometer with pedals linkage . The potentiometer output voltage should be within specification in neutral position. If not, adjust potentiometer.
6. loosen the bolts slightly ① and hold the nuts②
7. Using a wrench, turn the potentiometer to adjust the proper value of the potentiometer.
8. Tighten the bolts and the nut together.
9. Start engine and run at low idle.
10. Place the Sub shift lever in LOW gear. Tractor should not move. If tractor moves, repeat steps 4 through 10 until movement is eliminated (Forward and Reverse).

Specification :
Input Voltage --------------------------- 5.0 ± 0.1 volts
Forward Potentiometer Signal ----- 1.1 ± 0.05 volts
Reverse Potentiometer Signal ------ 1.1 ± 0.05 volts

2. HYDROSTATIC PUMP PRESSURE TEST

Reason:

To ensure that internal parts of the hydrostatic pump are not worn excessively, and the relief valves are operating properly.

Equipment :

1. 700 bar (10,000 psi) Gauge
2. 0 to 25 bar (0 to 300 psi) Gauge

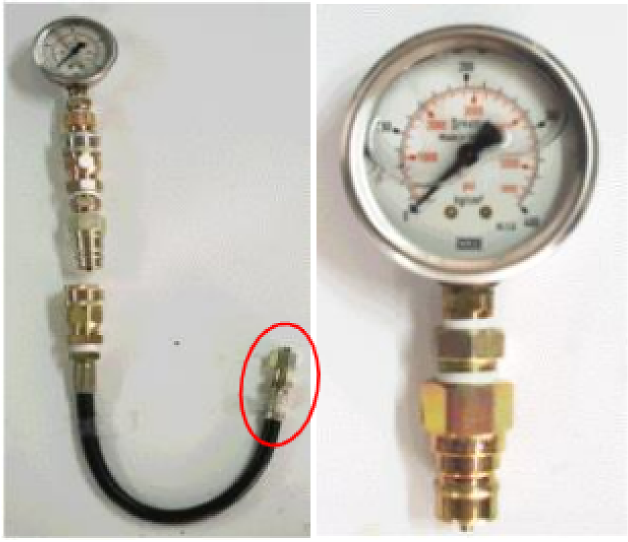


Fig.4-11 Pressure gauge

IMPORTANT : Make sure that the hydraulic fluid is visible in sight glass. Insufficient hydraulic fluid could cause the system to run dry and damage pump and motor.

IMPORTANT : Do not allow valves to relieve for more than 10 seconds or hydraulic oil may overheat.

Procedure :

1. Park tractor on a level surface.
2. Turn key switch to OFF position.
3. Make sure 4WD lever is in unlocked 2WD position.

⚠ CAUTION

AVOID SUDDEN TRACTOR MOVEMENT.Tractor could move suddenly causing severe injure or damage to equipment during test procedure. Perform test in open area.keep all personnel away from front or rear of tractor

4. Start engine and run until hydraulic oil is warm.
5. Stop engine.
6. Cycle all controls to relieve any pressure that may be in the hydraulic system.

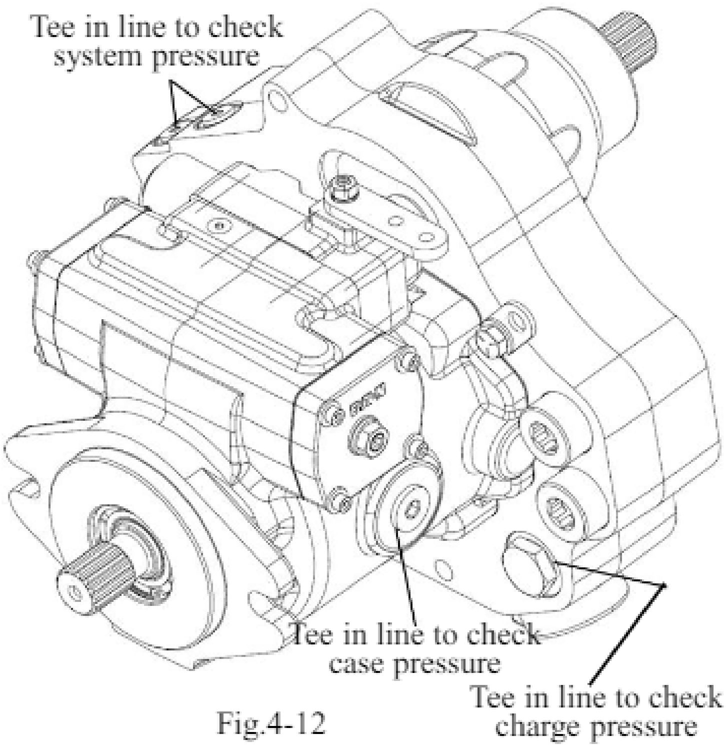

Tee in line to check system pressure
Tee in line to check case pressure
Tee in line to check charge pressure

Fig.4-12

7. Locate test ports on hydrostatic transmission inside tunnel opening.
8. Remove test port plugs.
9. Install one Fig.4-11 male quick coupler into each test port.
10. Attach Fig.4-11 gauge and hose assembly as shown each test port adapter.
11. Position gauges so they can be read from operator's seat.
12. Perform test from operators seat. Make sure park brake in engaged and press right and left brake pedals. Place Sub shift lever in 3 (high) position. Start engine and run at full throttle.

⚠ CAUTION

If brake fail to prevent wheels from turning. STOP TEST IMMEDIATELY.Repair or adjust brakes are necessary before resuming test. (See brake section)

13. Slowly depress forward directional pedal and observe gauge. Gauge should slowly rise to approximately 413 bar (5000psi) and relief valve will open with an audible squealing noise.
14. Repeat same procedure with reverse pedal.

Specifications:

-Pump pressure should reach approximately 413 bar (5000psi) in either direction and then relieve.

Results:

-If pressure will not reach 413 bar (5000psi) Maximum in either direction, check charge Pressure.

(SEE "CHARGE PUMP PRESSURE TEST)

-If charge pressure is good and hydrostatic pump pressure will not get up to relief pressure hydrostatic pump is worn or damaged.

-If pressure reaches 413 bar (5000psi) in one direction and not the other, one of the relief valves is defective or the seat is leaking.

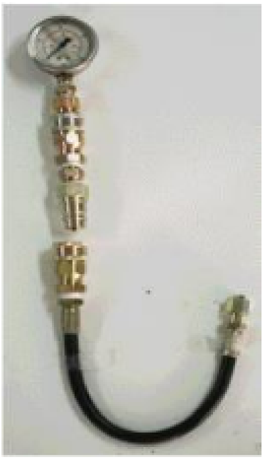
3.CHARGE PUMP PRESSURE TEST

Reason:

To ensure that charge pump is operating at specified pressure to supply oil to hydrostatic pump.

Equipment : Fig4-13

1) 17.24~20.68 (250~300 psi) Gauge
2) Hose with quick coupler
3) M14-1.5 Adapter



M14-1.5 Adapter

(Male type)

Fig.4-13

Procedure:

1.Park tractor on a level surface and set park brake.
2.Turn key switch to OFF position.
3.Shift transmission to NEUTRAL.

IMPORTANT: Make sure to relieve system pressure before loosening any system lines or hoses.

4. Cycle all controls to relieve any pressure that may be in the hydraulic system.

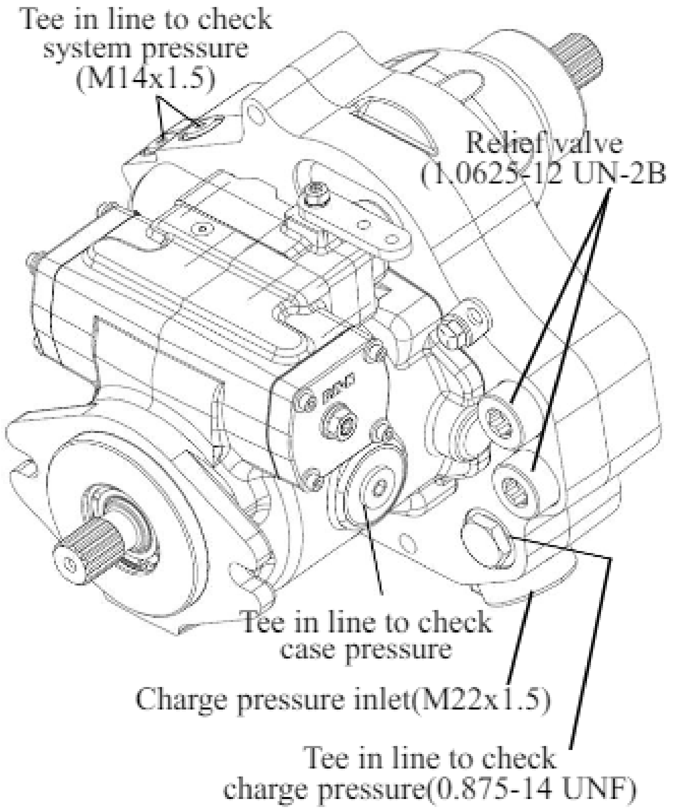

Tee in line to check system pressure (M14x1.5)
Relief valve (1.0625-12 UN-2B
Tee in line to check case pressure
Charge pressure inlet(M22x1.5)
Tee in line to check charge pressure(0.875-14 UNF)

Fig.4-14

NOTE:4WD shaft removed for clarity

5.Underneath the tractor, at the front of the tunnel, locate the hydrostatic transmission, Remove the plug in the charge pressure test port.
6.Assembled test equipment as shown and install to test port.
7.Start engine and run at high idle (2500~2700rpm).
8.Check pressure reading gauge.

Specifications:

Charge Pressure------17.24~20.68 bar (250~300psi).

Results:

-Charge pressure should reach 17.24~20.68 bar (250-300 psi) cannot obtained ; the mesh inlet filter may be restricted, the suction line may be restricted or leaking air, or front hydraulic pump may be defective

4. HYDRAULIC SYSTEM BLEED PROCEDURE

Reason :
To remove air trapped in the hydraulic system which will prevent proper operation.

Procedure:

IMPORTANT : If contamination is found in hydraulic system filter or inside reservoir, flush entire hydraulic system.

NOTE : Fill the hydraulic oil filter with new oil before installing.

1.Install a new hydraulic oil filter.
2.Fill the transaxle with specified and recommended Transmission oil to the proper level in sight glass.
3.Disconnect in plug to fuel shutoff solenoid.
4.Turn the key to START and hold for 10 seconds. Turn the key to OFF position.
5.Reconnect wires to fuel shutoff solenoid.
6.Raise tractor front end and support on suitable stands.
7.Start the engine and run at low idle.

IMPORTANT : If steering fails to respond, or pump pressure is not being delivered to steering control unit (SCU), shut engine off and check to see that steering hoses are connected to the correct SCU ports.

8.Slowly turn the steering wheel left and right until wheels turn smoothly indicating that any trapped air has been bled back to the reservoir.

IMPORTANT : If rock shaft fails to react to lift control lever movement, shut engine off and check hose clamps on suction tube elbow and manifold to ensure that they are properly tightened.

.

9.Operate rockshaft several times until it operates smoothly.
10.Stop the engine and check the hydraulic reservoir oil level. Fill as needed. Check all line connections for leaks; tighten if necessary.
11.Lower the tractor to the ground.
12.Drive tractor in forward and reverse several times until transmission operates smoothly.

SECTION 7. REPAIR

1.TRACTOR SPLITTING (FRONT)

Note: It is not necessary to remove the flywheel housing from the engine unless engine is being removed. Split the tractor between the tunnel and flywheel housing as outlined in the story below.

Prepare the Tractor :

1.Remove any mid or front attachments.

2.Park tractor on a level surface. Engage park brake, shut off engine.

3.Disconnect battery negative terminal.

4.Remove the HST unit referring to "SECTION 3-3 **SEPARATION OF THE FRONT TRANSMISSION AND THE SPACER TRANSMISSION.**

5.Cycle all hydraulic controls to relieve system pressure.

⚠ **CAUTION**:	To avoid injury from escaping hydraulic oil under pressure, relief the pressure in the system by stopping the engine and operating all hydraulic control valves.

Note: Hydraulic reservoir contains approximately 35ℓ (9.24 US gal) of oil. Have a suitable container ready to catch drain oil.

6.Drain hydraulic reservoir.

Assemble Tractor Sections.

NOTE: Splines on all drive shafts and couplers must be aligned before tractor sections are bolted together.

2.HYDROSTATIC TRANSMISSION DISASSEMBLY

Note : This is explained based on the Manual Servo Control Basic assembly here. The option which is applied on the machine is included as both types can be disassembled in the same way.

1) Introduction

This manual provides service information for the Eaton Model 77122 Hydrostatic Transmission. Step by step instructions for the complete disassembly, inspection, and reassembly of the transmission are given.

The following recommendations should be followed to insure successful repairs.

- Remove the Z- transmission from the vehicle.
- Cleanliness is extremely important.
- Clean the port areas thoroughly before disconnecting the hydraulic lines.
- Plug the pump ports and cover the open hydraulic lines immediately after they're disconnected.
- Drain the oil and clean the exterior of the transmission before making repairs.
- Wash all metal parts in clean solvent.
- Use compressed air to dry the parts. Do not wipe them dry with paper towels or cloth.
- The compressed air should be filtered and moisture free.
- Always use new seals when reassembling transmission.
- For replacement parts and ordering information Lubricate the new rubber seals with a petroleum jelly (Vaseline) before installation.
- Torque all bolts over gasketed joints, then repeat the torquing sequence to make-up for gasket compression.
- Verifying the performance of the Transmission after repair on an authorized test stand is essential.

2) Required Tools

- 9/16 in. Hex Key
- 5/32 in. Hex Key (Allen)
- 5/16 in. Hex Key
- 3/32 in. Hex Key (Allen)
- 5/64 in. Hex Key (Allen)
- 7/16 in. End Wrench
- 9/16 in. End Wrench
- 3/4 in. End Wrench
- 1 in. End Wrench
- 9/16 in. Socket
- 3/4 in. Socket
- 7/16 in. Socket
- Internal Retaining Ring Pliers (straight .070 tip)
- Internal Retaining Ring Pliers (straight .090 tip)
- External Retaining Ring Pliers (straight .090 tip)
- 9/32 in. retaining E-ring, applicator
- 1/2 in. retaining E-ring, applicator
- O-ring Pick
- Torque wrench(142.4 N•m[105 lbf•ft] capacity)
- Hammer (soft face)
- Light Petroleum Jelly
- Seal Driver
- Arbor Press
- Loctite (#222, #242, and #277 or equivalent)

3) Disassembly of transmission

The following instructions apply to a servo controlled hydrostatic transmission.

1. Position the transmission assembly into a jig which consists of a pilot hole with mounting holes for mating with the mounting flange of the front pump. Lock the mounting flange of the pump into the jig to prevent movement.
2. Motor Removal
   Remove the 8 mounting cap screws retaining motor housing to the center section.

Note : Mark motor housing orientation on center-section for reassembly purposes.

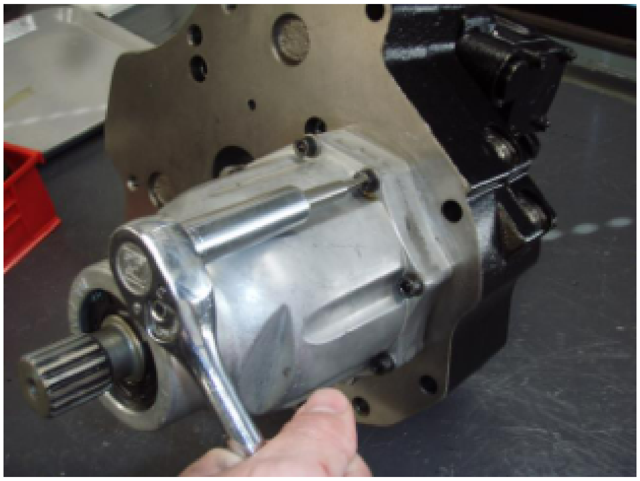


Fig.4-15

3. Pull motor housing straight up, retaining rotating kit with fingertips inside housing.

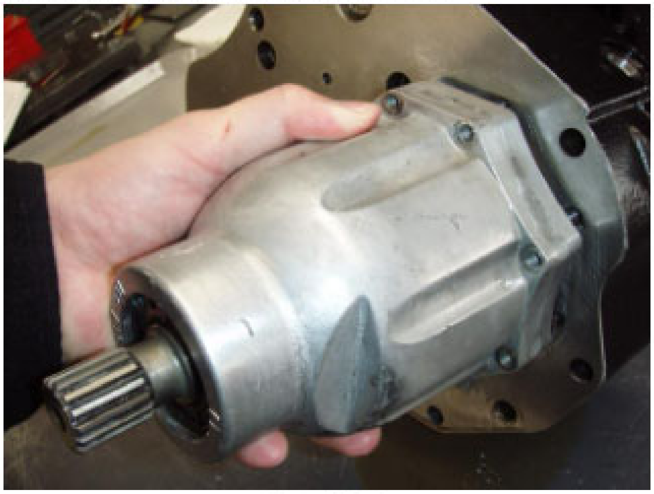


Fig.4-16

4. Remove valve plate from the center-section.

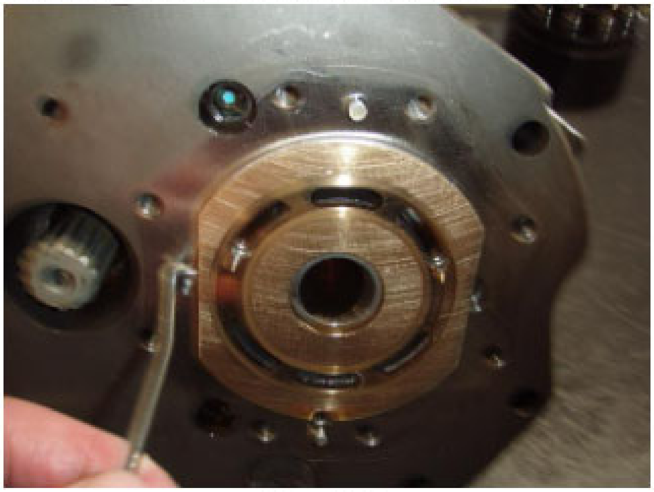


Fig.4-17

Center-section Inspection:

- Check the bearing (press fit) in the center-section. If needles remain in the cage, move freely, and setting is as per the dimension shown in figure 1-3, removal not required.
- Check roll pin in center-section. If tight and set to the dimension shown in figure 1-3, removal not required.

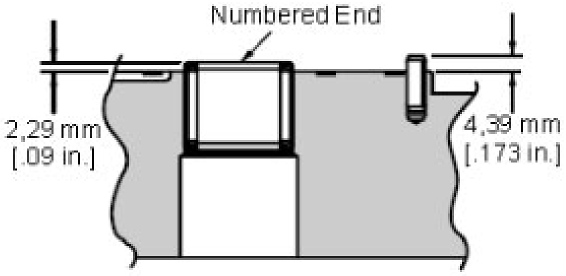


Fig.4-18

5. To remove rotating kit assembly from housing, lower the housing to the table with opening to the table. Catch the rotating kit with fingers to protect from impacting table. Lift and remove the housing and shaft from the rotating kit assembly.

Note: Vibrate motor housing o aid in releasing piston assemblies from the inside of housing.

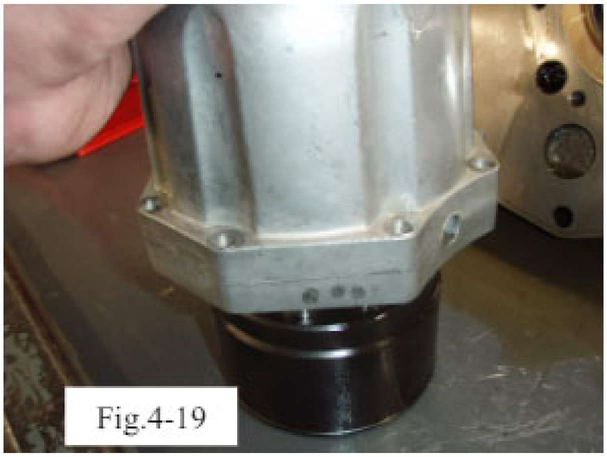


Fig.4-19

Refer to Appendix C for disassembly and inspection of rotating kit.

6. Turn over motor housing and remove thrust plate

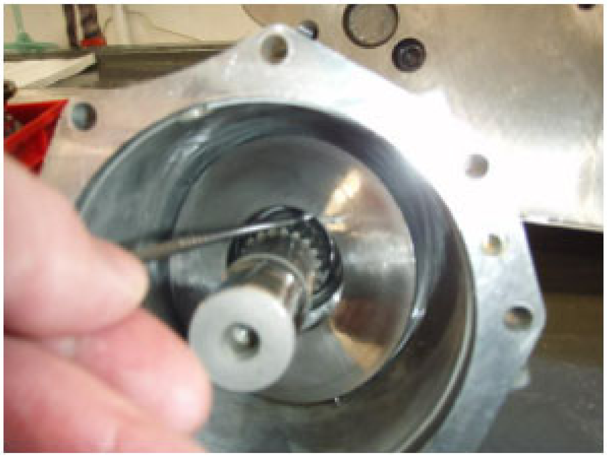


Fig.4-20

Thrust plate Inspection:

- The finish on the piston shoe surfaces of the thrust plate should show no signs of scoring.

7. For shaft removal, remove retaining ring from the front of motor housing.

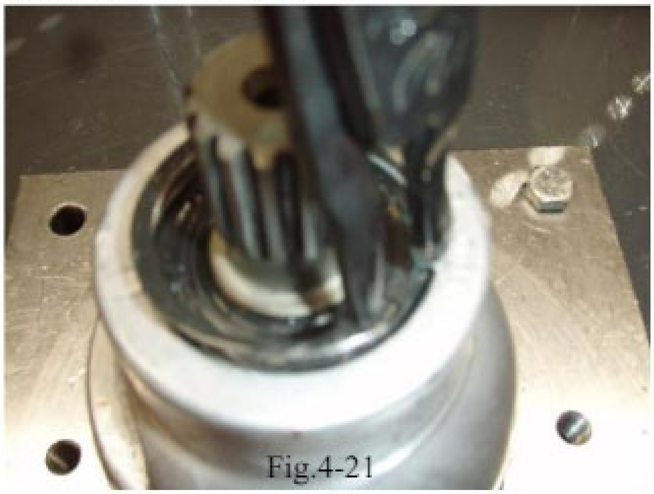


Fig.4-21

8. Press the shaft, shaft seal or spacer, and washer from housing.

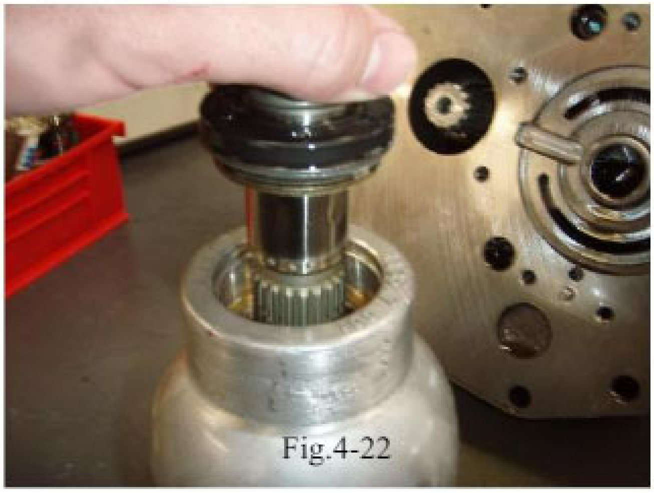


Fig.4-22

9. Remove retaining ring, thrust washer, thrust bearing, second thrust washer, and second retaining ring from shaft.

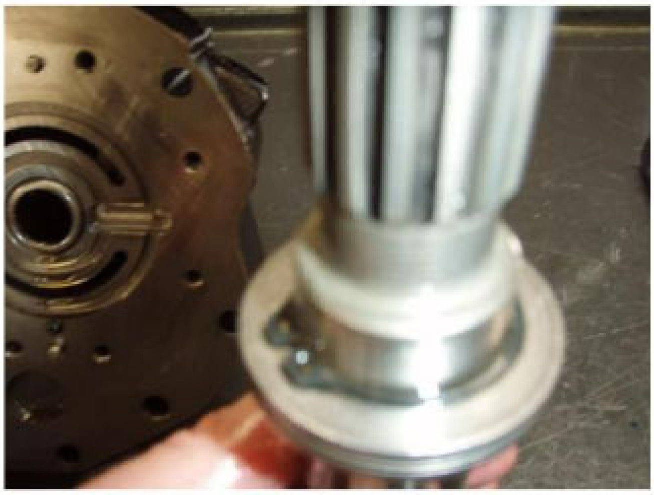


Fig.4-23

Center-section Valves Removal

10. From center-section, remove charge relief valve and system relief valve assemblies.

Note: Mark the relief valve in relationship to the cavity it was removed for assembly purposes.

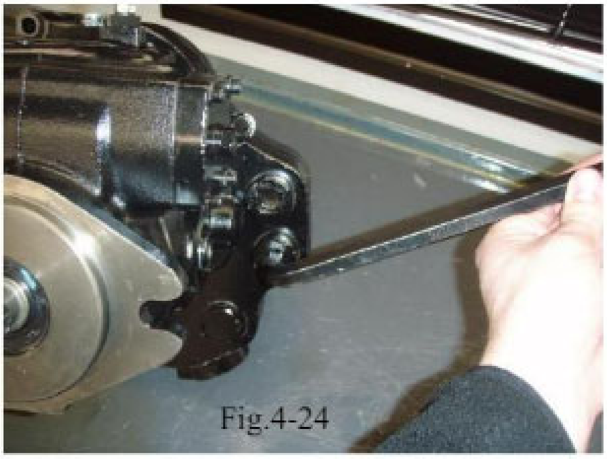


Fig.4-24

11. Inspect system relief valves for worn or broken components. Ensure valve is held taught by conical spring so that valve remains upright under own weight.

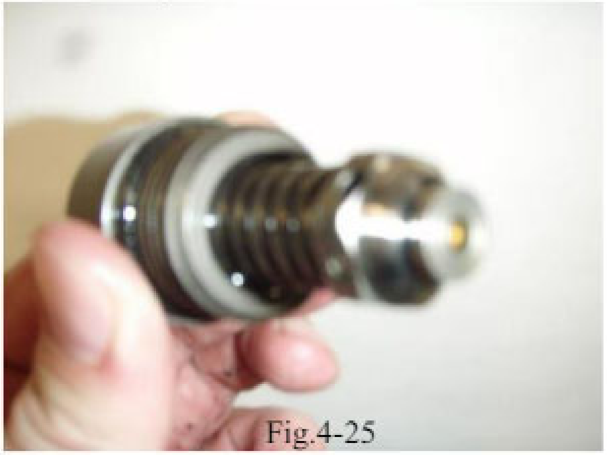


Fig.4-25

Pump Removal

12. Remove the four cap screws located on the center-section.

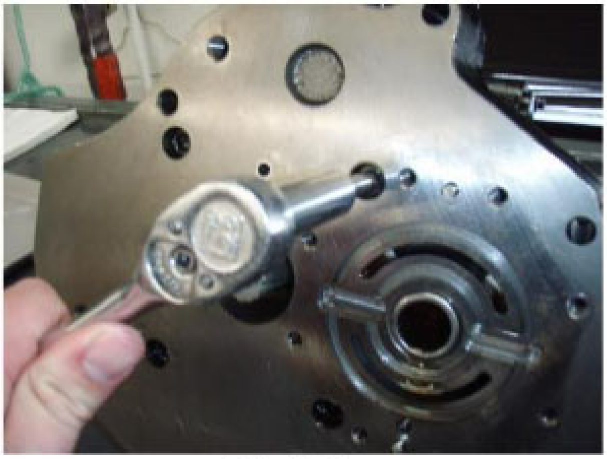


Fig.4-26

13. Lift Back plate straight up off shaft and housing. Remove valve plate from end cover or from rotating kit assembly, still in housing.

14. From back plate, remove bypass valve or plug, and relief valve assemblies.

Note: Mark the relief valve in relationship to the cavity it was removed, for reassembly purposes.

Back plate Inspection:

- Check the bearing (press fit) in back plate. If needles remain in cage, move freely, and setting is at the dimension shown in figure 1-3, removal not required.

- Check roll pin in back plate. If tight and set to the dimension shown in figure 1-3, removal not required.

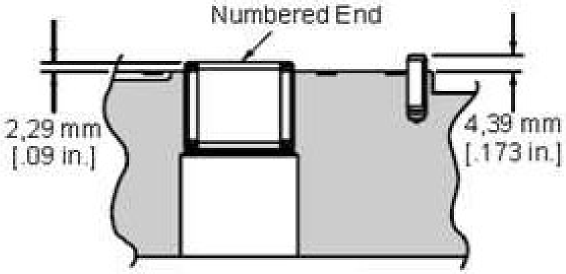


Fig.4-27

15. Remove housing gasket from housing or back plate.

16. With pump still in jig, remove the six cap screws retaining the manual servo control assembly. Remove the control assembly and control housing gasket from the housing.
Remove orifice plates, noting location for reassembly. Remove nut and lock washer from control arm, remove arm. Note position of control arm for reassembly. Refer to Appendix A for disassembly and Inspection of control assembly.

17. To remove rotating kit assembly from housing, first remove pump from jig holding the rotating kit assembly in position. Lower the pump so that the shaft end (flange end) is up. Set the rear of housing onto table with housing flat and rotating kit assembly at rest on table. (Hole in table, for protruding shaft, is required) Lift and remove the housing and shaft from rotating kit assembly, and swash plate.

18. Remove swash plate from rotating kit assembly and servo piston follower from swash plate. Refer to Appendix B for disassembly and Inspection of rotating kit.

Swash plate Inspection:

- Inspect swash plate bushing surface for wear and for coating transfer from bushing.
- The finish on the piston shoe surfaces of the swash plate should show no signs of scoring.

19. To remove servo piston assembly from housing, start with the four each cap screws and washers retaining each cover plate.

20. In removing the cover plate from the servo piston bolt, remove jam nut, washer, and seal washer. Hold the servo piston bolt with hex key and unscrew cover plate off bolt.

21. Remove servo piston assembly and seal sub-assemblies (two sets) from housing.

Note : Disassembly of servo piston assembly is not required.

22. Remove retaining ring from the front of housing. Press the shaft, shaft seal or spacer, and washer from housing. Remove retaining ring, thrust washer, thrust bearing, second thrust washer, and second retaining ring from shaft.

Disassembly and Reassembly

Housing Inspection:

- Check the bearing (press fit) in housing. If needles remain in cage, move freely, and setting at the dimension shown in figure 1-4, removal not required.

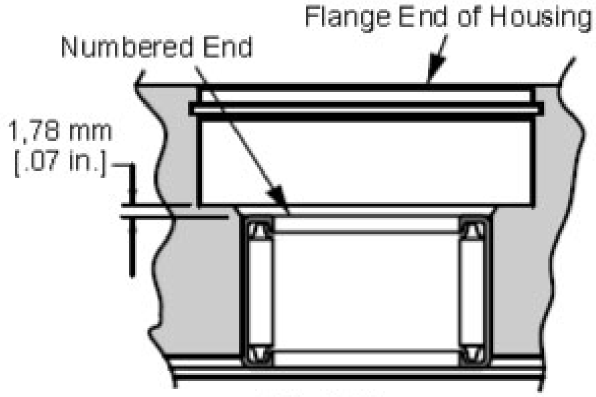


Fig.4-28

23. To remove cradle sub-assembly, remove the two cap screws retaining cradle inside housing. Move the cradle subassembly back and forth to release dowel bushings and removing cradle subassembly from housing.

24. Remove button head cap screws to remove bushing from cradle.

Bushing Inspection:

- Inspect bushing for contamination embedment within coating of bushing surface coming in contact with swash plate.

25. Remove all plugs from housing.

26. Discard the shaft seal, gaskets, and o-rings from all assemblies. Replace with new seals upon reassembly.

Reassembly - Servo Controlled Piston Pump

1. All parts should be cleaned and critical moving parts lubricated before reassembly.

2. If necessary, press new bearing in housing to dimension shown in figure 1- 4 with the numbered end of bearing outward.

3. Install the two new seal sub-assemblies into the servo piston cavity of housing.

4. Screw the cover plate onto the servo piston assembly. Install new cover plate gasket in place on housing. Install servo piston assembly and cover plate into servo piston bore in right side of housing (as shown in figure 1-1 and figure 1-5).
Retain cover plate with four each washers and cap screws.
Torque cap screws 4.5 to 5.4 N•m [40 to 48 lbf•in.].
To obtain neutral, centering the servo piston assembly is required. Measure in from the left side and set servo piston 12,7 mm [.5 in.] from surface of housing servo bore as shown in figure 1-5.

Note : Re-adjustment may be required for neutral at unit start-up

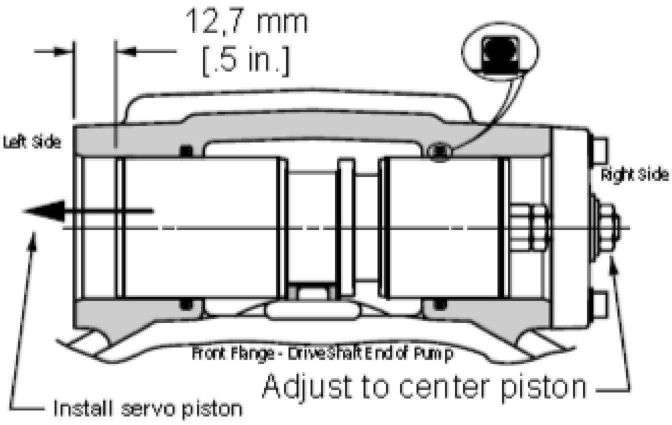


Fig.4-29

5. Install new seal washer, washer, and jam nut to servo piston bolt. Holding servo piston bolt with hex key wrench Torque jam nut 17 to 18 N•m [150 to 160 lbf•in].
Check the centering of servo piston assembly.
Install new cover plate gasket and cover plate to left side of servo piston and retain with four each washers and #10-24 cap screws. Torque cap screws 4,5 to 5,4 N•m [40 to 48 lbf•in.].

6. To assemble cradle sub-assembly, install bushing onto cradle retaining with button head cap screws. Torque button head cap screw 1,6 to 1,8 N•m [14 to 16 lbf•in.]

7. Place cradle sub-assembly into housing making sure dowel bushings and cradle is completely seated into housing. Retain cradle sub-assembly with two cap screws. After applying loctite #277(or equivalent) to the end of threads.
Torque cap screws 27 to 33 N•m [20 to 24 lbf•ft].

8. To install shaft, place exterior retaining ring, thrust race, thrust bearing, second thrust race, and second retaining ring onto shaft. Position washer and shaft seal or spacer onto shaft.

9. Install shaft assembly into front of housing for units with spacer, retain with interior retaining ring and go on to step 10.
For units with shaft seal, seat seal into position with seal driver and retain with interior retaining ring.

10. Install servo piston follower onto swash plate dowel pin. Install swash plate carefully onto bushing (coat bushing surface with hydraulic oil), aligning servo piston follower with slot in servo piston assembly.

Refer to Appendix B for reassembly of rotating kit assembly.

11. To install rotating kit assembly, leave housing and shaft in the horizontal position. Holding swash plate into position with screw driver thru controller linkage passageway at the top of housing, place rotating kit assembly over shaft and into housing until pistons are in against swash plate.
Make sure all parts are in housing completely and properly positioned. Return the pump to the vise with open end of housing up, clamping housing on the outer portion of the flange.

12. Install gasket on to housing.

13. If necessary, press new bearing and roll pin in end cover to dimension shown in figure 1-3. Bearing installed with the numbered end outward. Roll pin installed with split oriented away from bearing.

14. Install new o-ring on relief valves. Install relief valve in its original cavity in end cover that it was removed.
Torque136 to 149 N•m [100 to 110 lbf•ft.]

15. Install new o-ring on bypass valve or plug. Install bypass valve or plug into end cover.
Note: Make sure paddle of bypass valve is perpendicular to relief valve axis prior to installing or damage could result.

16. Apply a small amount of petroleum jelly to the steel side of valve plate to hold in place for installation. Aligning the index pin, place the valve plate in position onto the end cover, with steel side against end cover.

17. Install end cover assembly onto housing assembly. Make sure ports are positioned correctly, valve plate and gasket stay in place
No gyrator charge pump, skip to step 20.

18. Install key and inner ring gyrator onto shaft or coupler assembly. Lubricate inner ring gyrator. Refer to Appendix A for reassembly of charge relief valve in adapter plate.

19. Install o-ring and outer ring gyrator onto adapter plate. Lubricate both o-ring and outer ring to hold in position during assembly of adapter plate. Install adapter plate onto end cover. Make sure o-ring and gyrator ring stay in place.

20. Retain end cover and adapter plate (when used) with four cap screws,
Torque 37 to 42 N•m [27 to 31 lbf•ft].

Refer to Appendix B for reassembly of manual servo control assembly.

21. Install control housing gasket onto housing. Install orifices into control assembly and retain in position with petroleum jelly.
Position the feedback link at 90 degrees from control housing. Install manual servo control assembly onto housing making sure feedback link entered small groove in servo piston assembly.

22. Retain control assembly with six cap screws,
Torque 4,5 to 5,4 N•m [40 to 48 lbf•in].

23. Install control arm onto control assembly input arm. Retain with lock washer and nut,
Torque 5 to 8 N•m [4 to 6 lbf•ft]

24. Install new o-rings on all plugs. Install plugs into housing.
Torque 3/4 in. plug28 to 32 N•m [21 to 24 lbf•ft].
Torque 1-1/4 in. plug 54 to 61 N•m
[40 to 45 lbf•ft].

25. Refer to start-up procedures on the end of page.

Appendix A

-Manual Servo Control Basic Assembly

Disassembly - Manual Servo Control Assembly

1. Remove wiper seal with screw driver. Remove set screw retaining input shaft and remove input shaft from control housing.

2. Remove set screw from plug retaining valve spool and remove plug.

3. Remove E-ring from pin retaining feedback link and valve spool. Remove pin, feedback link, valve spool, and bell crank from control housing.

4. Compress spring and remove E-ring, spring retainer, spring, and second spring retainer from valve spool.

5. Remove o-rings from plug and input shaft. Clean all parts and lubricate in preparation for reassembly.

Reassembly - Manual Servo Control Assembly

1. Install spring retainer, spring, and second spring retainer onto spool. Compress spring with retainer and retain with E-ring onto valve spool.

2. Install valve spool into control housing making sure that metering notches on valve spool can be seen in the metering ports. Notches shown in figure 2-1.

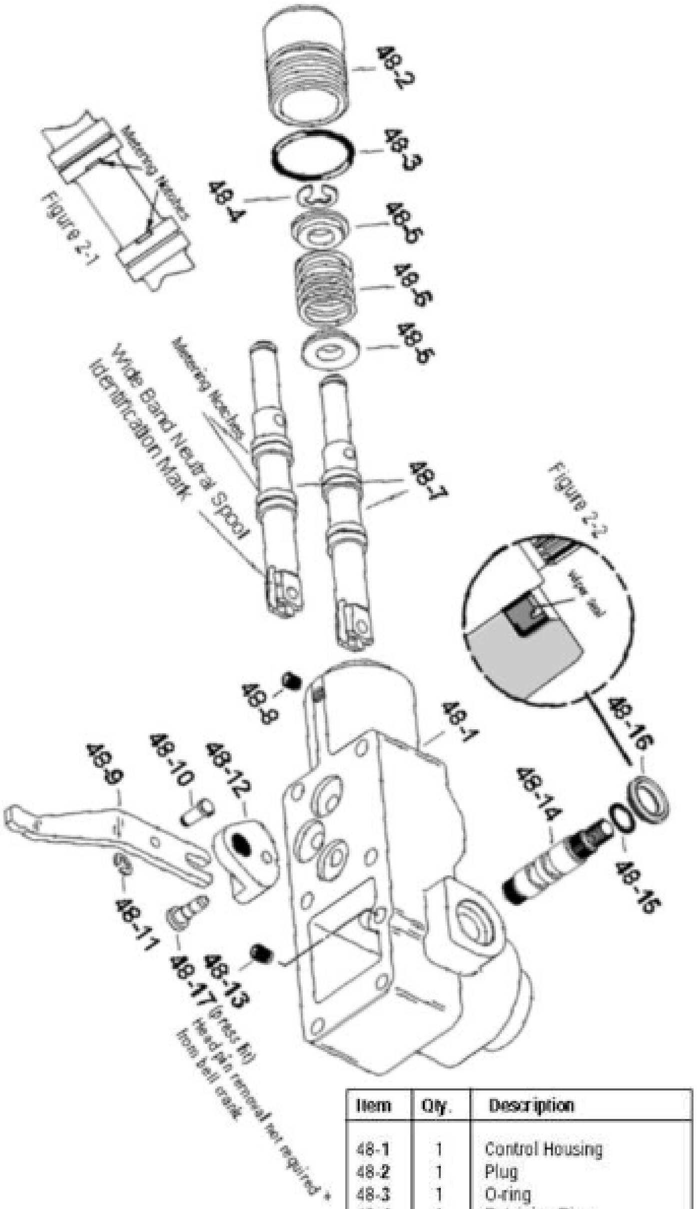
3. Position bell crank in housing. Slide feedback link into position between clevis on valve spool, aligning holes, and install dowel pin retaining with E-ring.

4. Install new o-ring onto input shaft. Hold bell crank in position with feedback link slot and align splined hole of bell crank with input shaft cavity.
Install input shaft into control housing and bell crank.

5. Apply Loctite #242 or equivalent to set screw and install, retaining input shaft. Adjust set screw until it bottoms out on input shaft and back out one-quarter turn.

6. Install wiper seal on input shaft as shown in figure.

7. Install new o-ring onto plug, retaining valve spool, and install plug. Adjust plug until there is no play in the valve spool with input shaft held stationary. Lock in place with set screw.
Torque set screw 2 to 3 N•m [17 to 25 lbf•in].



Item	Qty.	Description
48-1	1	Control Housing
48-2	1	Plug
48-3	1	O-ring
48-4	1	Retaining Ring
48-5	2	Spring Retainer
48-6	1	Spool Centering Spring
48-7	1	Valve Spool
48-8	1	Set Screw
48-9	1	Feedback Link
48-10	1	Dowel Pin
48-11	1	Retaining Ring
48-12	1	Bell Crank
48-13	1	Set Screw
48-14	1	Input Shaft
+ 48-15	1	O-ring
+ 48-16	1	Wiper Seal
48-17	1	Head Pin (press fit)

Fig.4-30

Appendix A
-Manual Servo Control Assembly Options

Disassembly - Destroke Valve Assembly Option

1. Remove the two cap screws and lock washers from manifold. Removing destroke valve assembly and two o-rings.

2. Remove destroke valve from manifold in order to remove o-rings and back-up washers.

Note: in order to remove destroke valve the solenoid may need to be removed from core first (not shown).

Reassembly - Destroke Valve Assembly Option

1. Install new o-rings and back-up washers onto destroke valve.

2. Install destroke valve into manifold by hand until top o-ring is met by manifold. Then wrench tighten to 34N•m [25 lbf•ft.] max. Loosen Nut retaining coil to reposition if necessary and re-torque 5,4 to 7 N•m [4 to 5 lbf•ft.].

3. Lubricate the two o-rings and install onto manifold. Install destroke valve assembly onto control assembly. Retain with lock washers and cap screws. Torque 3 to 3,5 N•m [27 to 31lbf•in.].

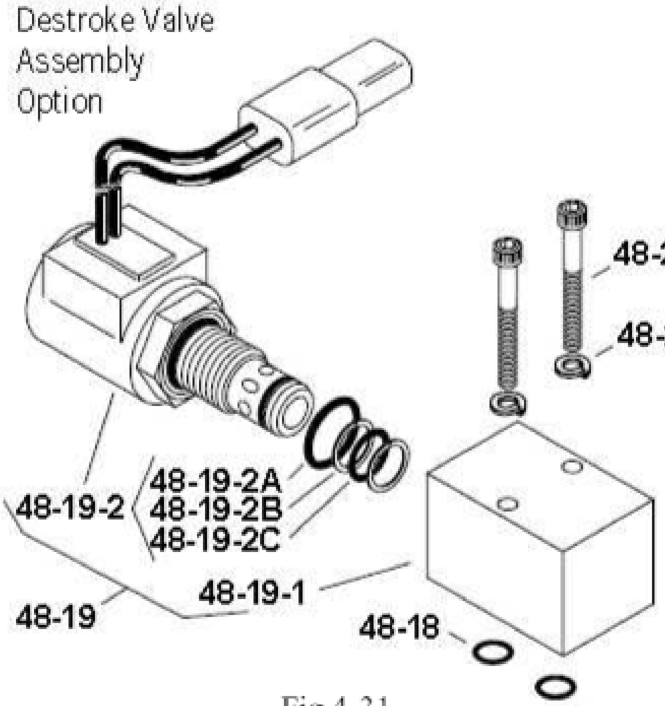
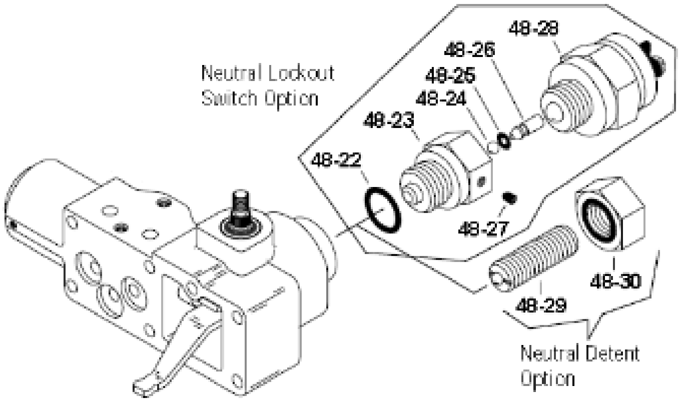


Fig.4-31



48-**18** O-ring (2)
48-**19** Destroke Valve Assy.
48-**19-1** Manifold
48-**19-2** Destroke Valve
48-**19-2A** O-ring
48-**19-2B** Back-up Washer
48-**19-2C** O-ring
48-**20** Lock Washer (2)
48-**21** Cap Screw (2)
48-**22** O-ring
48-**23** Adapter, Neutral Lockout
48-**24** Ball
48-**25** O-ring
48-**26** Pin
48-**27** Set Screw
48-**28** Neutral Lockout Switch
48-**29** Ball Plunger
48-**30** Nut, Seal

Fig.4-32

Disassembly - Neutral Lockout Switch Assembly Option

1. Loosen set screw in adapter and remove neutral lockout switch from adapter.

2. Remove neutral lockout adapter from control assembly.

3. Remove pin, ball, and o-rings from adapter.

Reassembly - Neutral Lockout Switch Assembly Option

1. Install new o-ring onto adapter and new o-ring onto pin.

2. Install ball and pin into adapter. Lubricate with petroleum jelly to hold in place during installation.

3. Install adapter into control assembly.
Torque 60 to 70 N•m [44 to 53 lbf•ft].

4. Apply Loctite #222 or equivalent to threads of switch and install neutral lockout switch into adapter. The adjustment procedures for the switch are as follows.

a) Install switch, while moving control arm back and forth, until "detent" action is detected. Back out the switch until the "detent" action is very slight.

b) Obtain a test light or use a multi-meter. Attach the leads from the test light to the switch or the wiring connector.

c) Move the control arm out of the detent position. The test light will go on. Screw in the switch until the light goes off. Mark this as position "A". See figure 2-3. Move the control arm to the detent position and the test light should come back on.

d) Leaving the control arm in the detent position, the light will remain on. Screw in the switch until the light goes off. Mark this position "B".

e) Unscrew the switch one third of the distance between "B"and "A". Install and tighten the hex socket head set screw in one of the upper quadrants of the hex of the switch adapter.
See figure 2-3.
Torque set screw 3.2 to 3.8 N•m [28 to 34 lbf•in.]

5. Test the switch by moving the control arm to the detent position, the light should be on. Move the control arm out of detent, the light should go off.

6. Remove test light and put servo control assembly into operation.

Disassembly - Neutral Detent Option

1. Loosen seal nut and remove ball plunger from control housing.

Reassembly - Neutral Detent Option

1. Install ball plunger into control housing until contact with bell crank detent is detected.
After contact, screw in 1/2 turn and retain with seal nut.
Torque nut 14 to 30 N•m [10 to 22 lbf•ft].

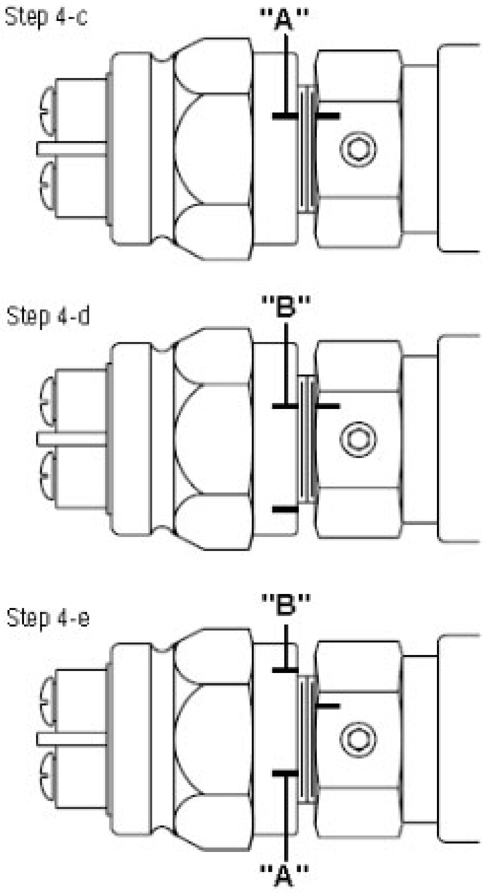
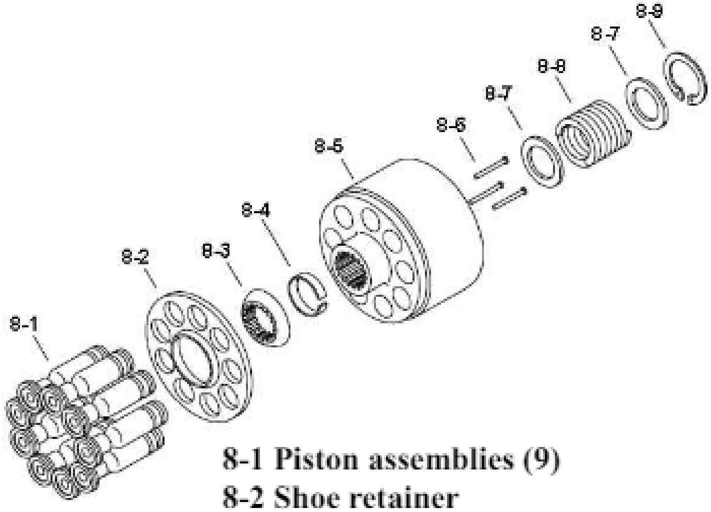


Fig.4-33

Disassembly
- Rotating Kit Assembly

Disassembly of rotating assembly is required for inspection only.

1. Remove the nine piston assemblies, shoe retainer, and shoe retainer pivot from cylinder barrel.



8-1 Piston assemblies (9)
8-2 Shoe retainer
8-3 Shoe retainer pivot
8-4 Retainer
8-5 Cylinder barrel
8-6 Pins (3)
8-7 Washer (2)
8-8 Spring
8-9 Retaining ring

Fig.4-34

Inspection :

- Examine the O.D. of the pistons for finish condition. They should not show wear or deep scratches. Inspect the shoes for a snug fit on the ball end of the pistons and a flat smooth surface that comes in contact with the swash plate.

Do not lap piston shoes.

- Examine the shoe retainer for wear in the pivot area.
- Examine the pivot to insure smoothness and no signs of wear.
- Inspect the cylinder barrel surface that makes contact with valve plate. This surface should be smooth and free of deep scratches. **Do not lap piston block**.
- The pistons should move freely in the cylinder barrel bore. If they are sticky in the bore, examine the bore for scoring or contamination.

2. To inspect pins and spring **caution** should be taken in removing spring.
The **spring is highly compressed** and the retaining ring should not be removed without compressing the spring safely.
The following parts are required to disassemble the cylinder barrel :
2 ea. 3/8 in. I.D. x 1-1/8 in. O.D. flat washers
1 ea. 3/8 in. x 3-1/4 in. N.C. cap screw, and
1 ea. 3/8 in. N.C. nut

To remove spring, place one of the flat washers over the 3/8 in. x 3-1/4 in. cap screw.
Put cap screw through the center of the cylinder barrel and apply the second washer. Let washer rest on the three pins and retain with nut.
Turning nut and compressing spring inside the barrel. Use a pair of retaining ring pliers and remove the internal retaining ring.
Remove nut, bolt, and the two washers from barrel.
Remove the washer, spring, second washer, three pins, and pin keeper at the same time.

Reassembly
- Rotating Kit Assembly

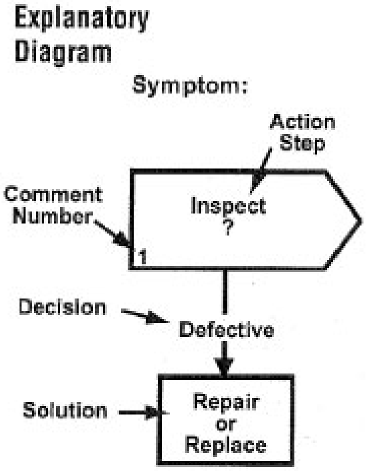
1. To reassemble the rotating kit assembly complete the following : Compress the pin keeper and install in the spline of the cylinder barrel.
Install the three pins with head end to the inside of the block and position in the special groove of the piston block spline.

2. Install the washer, spring, and second washer into the cylinder barrel. Use the two 3/8 in. I.D. washers, nut, and 3/8 in. x 3-1/4 in. cap screw to compress the spring and retain with retaining ring. Remove the nut, cap screw, and the two washers.

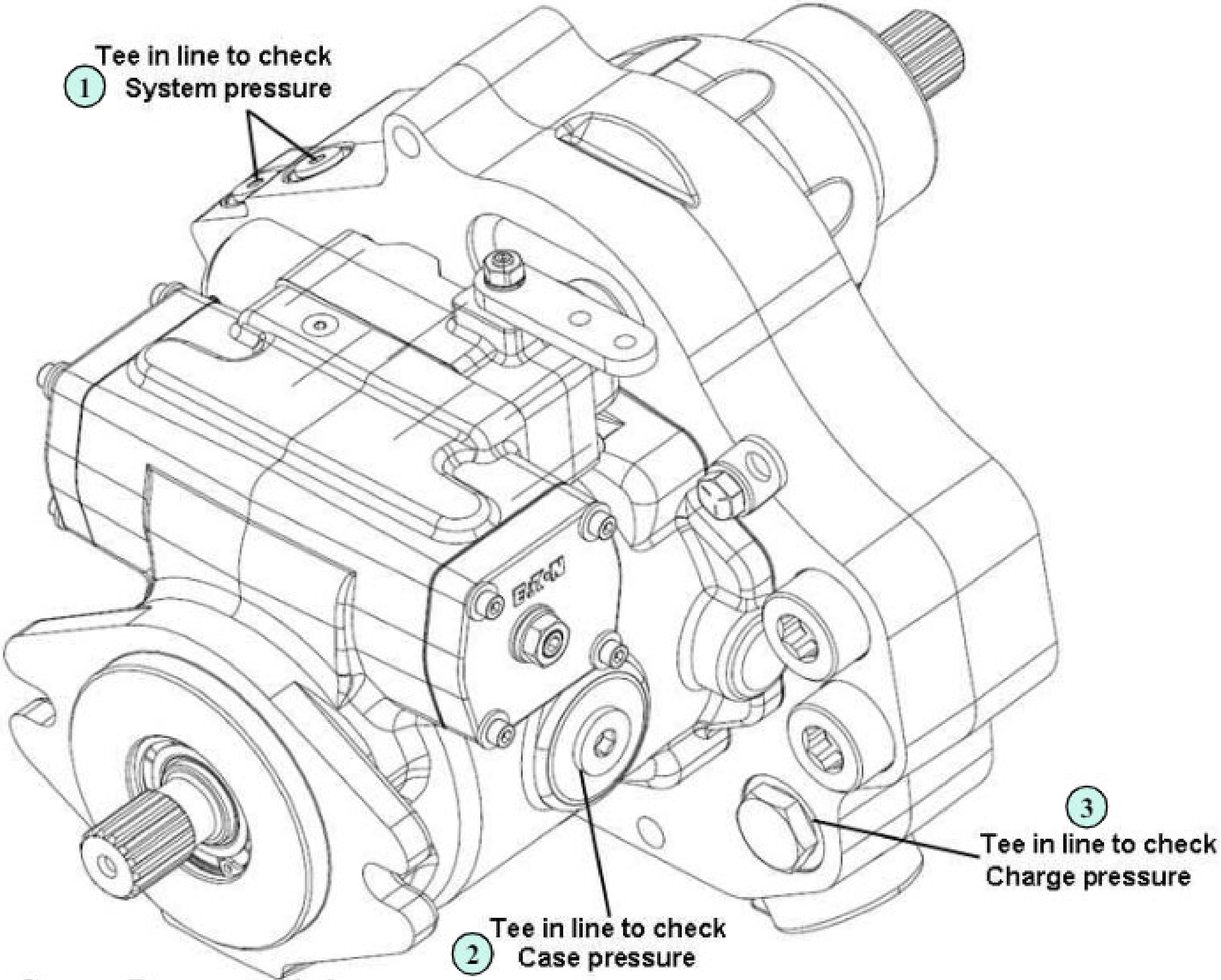
3. Install the pivot onto the three pins, shoe retainer on the pivot, and piston assemblies thru the shoe retainer and into cylinder barrel, resting on shoe retainer.

Fault
- Logic Trouble Shooting

This fault-logic trouble shooting guide is a diagnostic aid in locating transmission problems.
Match the transmission symptoms with the problem statements and follow the action steps shown in the box diagrams.
This will give expedient aid in correcting minor problems eliminating unnecessary machine down time.
Following the fault - logic diagrams are diagram action comments of the action steps shown in the diagrams.
Where applicable, the comment number of the statement appears in the action block of the diagrams.



Recommended Gauge Location


① Tee in line to check System pressure
② Tee in line to check Case pressure
③ Tee in line to check Charge pressure
EATON

Gauges Recommended
1) System pressure gauge : 700 bar [10,000 PSI]
2) Case pressure gauge : 0 to 25 bar [0 to 300 PSI]
3) Charge pressure gauge : 0 to 25 [0 to 300 PSI]

Fig.4-35

Symptom 1 : Neutral difficult or impossible to find

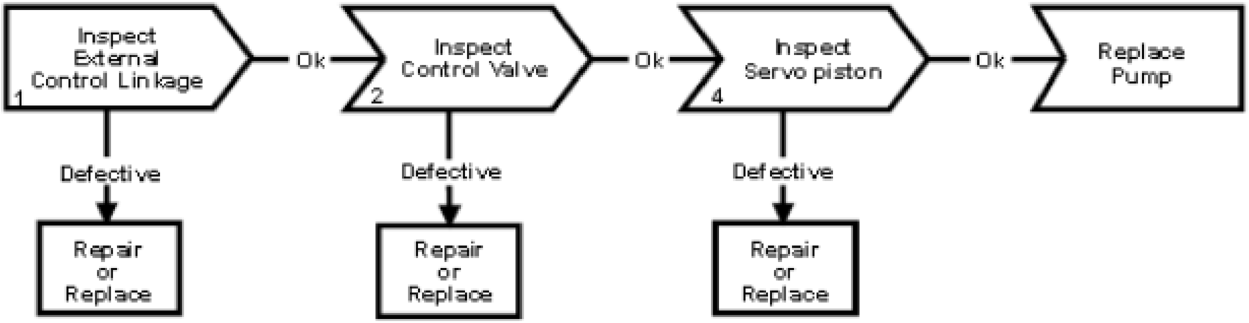


Fig.4-36

Symptom 2 : System operating hot

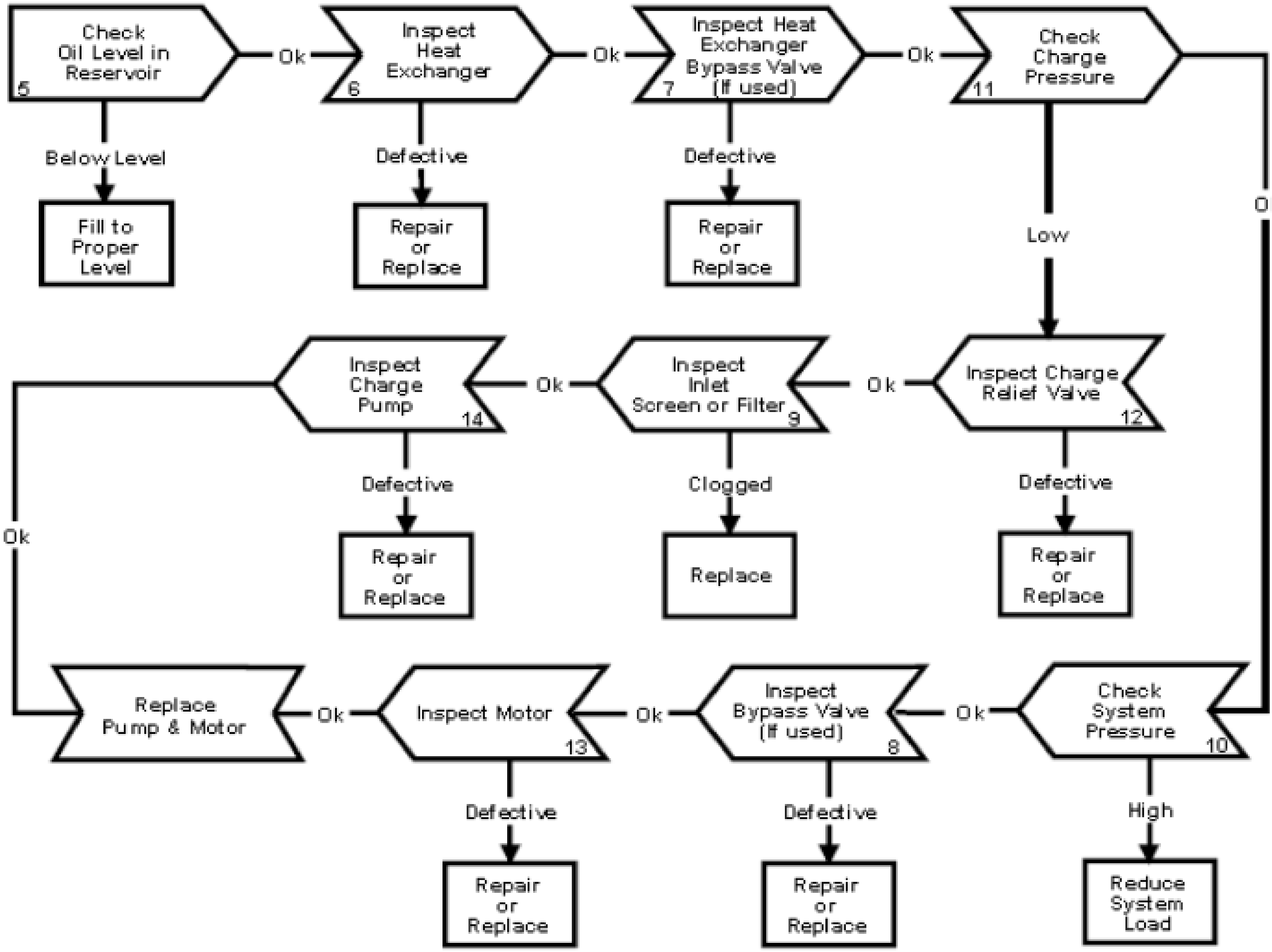


Fig.4-37

Symptom 3 : Operates in one direction only

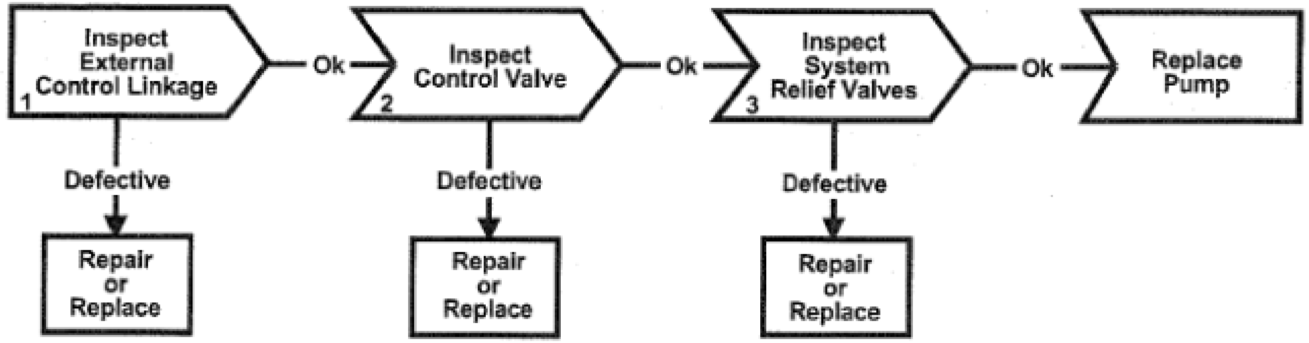


Fig.4-38

Symptom 3 : System response sluggish

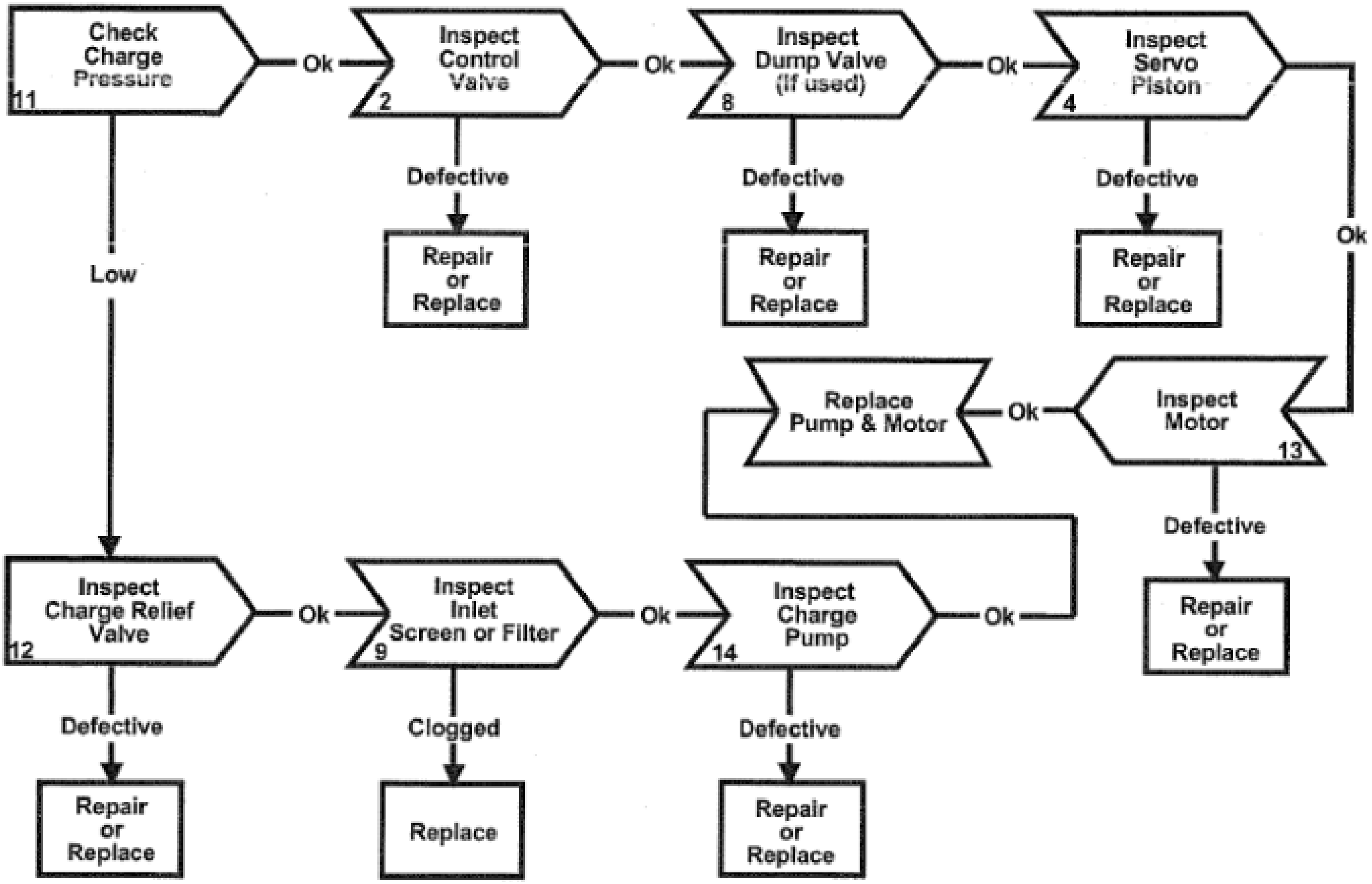


Fig.4-39

Symptom 5 : System will not operate in either direction

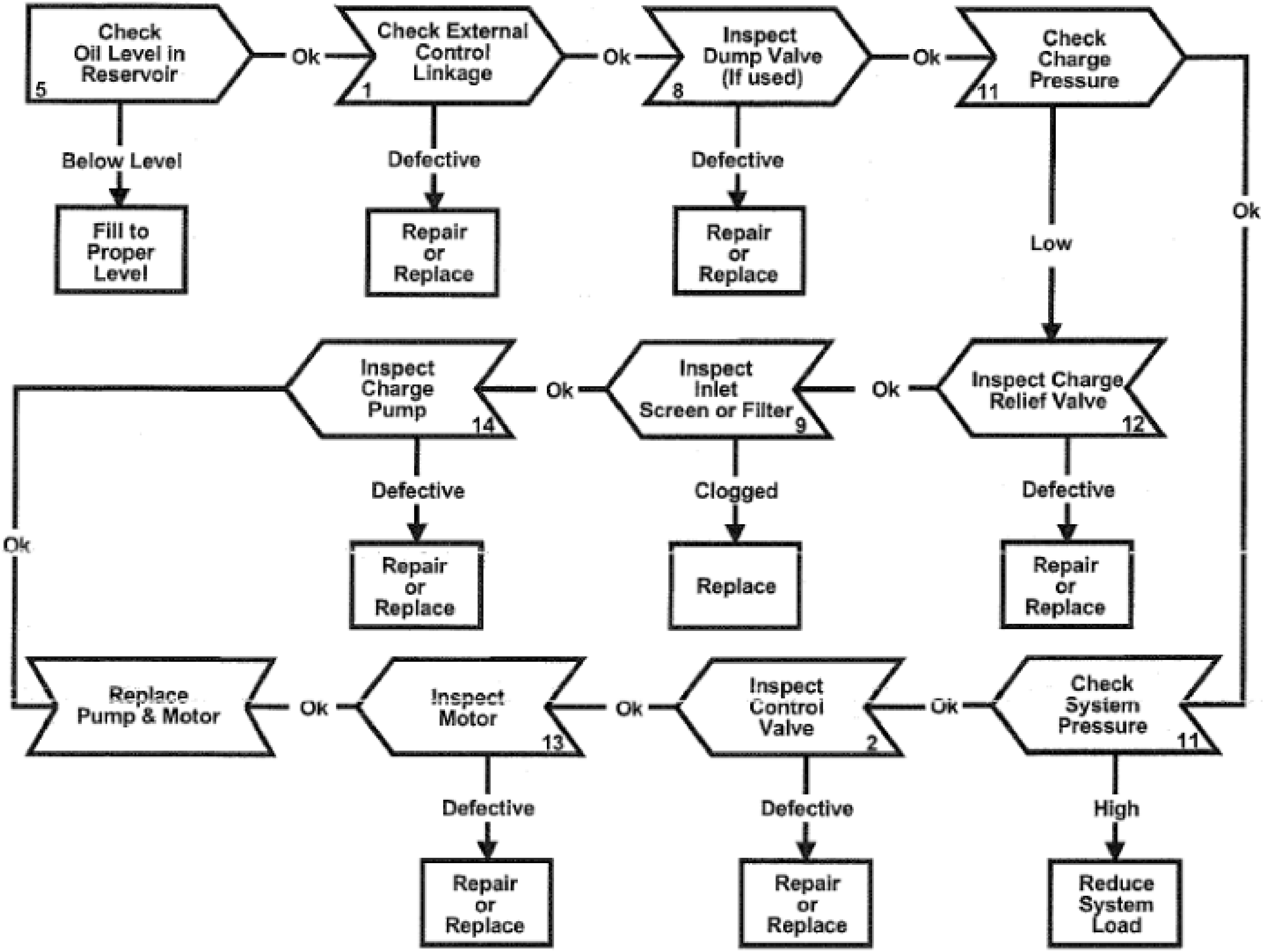


Fig.4-40

Fault
- Logic Trouble Shooting
Diagram Action Step Comments

1. Inspect External Control Linkage for :
a. Misadjusted or disconnected
b. Binding, bent, or broken

2. Inspect Control Valve for :
a. Plugged control orifice (s)
b. Damaged mounting gasket
c. Misadjusted, damaged or broken neutral return spring
d. Broken control connector pin
e. Faulty destroke valve (if used)
f. Galled or stuck control spool
g. Neutral detent or lockout switch misadjusted (if used)

3. Inspect System Relief Valves * for :
a. Improper pressure relief setting
b. Damaged or broken spring
c. Valve held off seat
d. Damaged valve seat

4. Inspect Servo Piston for :
a. Misadjusted, damaged or broken neutral return spring assembly
b. Galled or stuck servo piston
c. Damaged or missing o-ring and/or back-up ring

5. Check Oil Level in Reservoir:
a. consult owner/operators manual for the proper type fluid and level

6. Inspect Heat Exchanger for :
a. Obstructed air flow (air cooled)
b. Obstructed water flow (water cooled)
c. Improper plumbing (inlet to outlet)
d. Obstructed fluid flow

7. Inspect Heat Exchanger Bypass Valve for :
a. Improper pressure adjustment
b. Stuck or broken valve

8. Inspect Bypass Valve for : (if used)
a. Held in a partial or full open position

9. Inspect Inlet Screen or Filter for :
a. Plugged or clogged screen or filter element
b. Obstructed inlet or outlet
c. Open inlet to charge pump

10. Check System Pressure :
a. See figure 3-1 for location of pressure gauge installation
b. Consult owner/operators manual for maximum system relief valve settings

11. Check Charge Pressure :
a. See figure 3-1 for location of charge pressure gauge installation
b. Consult owner/operators manual for maximum charge relief valve settings

12. Inspect Charge Relief Valve for :
a. Improper charge relief pressure setting *
b. Damaged or broken spring
c. Poppet valve held off seat

13. Inspect Motor for :
a. Consult owner/operator manual for motor operation and trouble shooting

*** System/Charge Relief Valve Pressure Settings**

Inlet Vacuum 0,203 bar [6 inHg] max.
Case Pressure 1,7 bar [25 PSI] max.
Charge Pressure 17,24 to 20,68bar[250 to 300 PSI]
System Pressure 413 bar [5000 PSI] max.
207 bar [3000 PSI] continuous

The high pressure relief valves are all factory preset and cannot be readjusted.
The pressure setting is stamped on each valve with a three digit number.
To identify, multiply the noted number by 10 to get the valves pressure setting.
Example: 10 x 500 = [5000 PSI] 413 bar

Start-up Procedure

When initially starting a new or a rebuilt transmission system, it is extremely important that the start-up procedure be followed.
It prevents the chance of damaging the unit which might occur if the system was not properly purged of air before start-up.

1. After the transmission components have been properly installed, fill the servo pump housing at least half full with filtered system oil. Connect all hydraulic lines and check to be sure they are tight.

2. Install and adjust all control linkage.

3. Fill the reservoir with an approved oil that has been filtered through a 10 micron filter.
Refer to Eaton Hydraulics Technical Data sheet number 3-401 titled Hydraulic Fluid Recommendations.

4. Gasoline or L.P. engines: remove the coil wire and turn the engine over for 15 seconds.
Diesel engines: shut off the fuel flow to the injectors and turn the engine over for 15 seconds.

5. Replace the coil wire or return the fuel flow to the injectors. Place the transmission unit in the neutral position, start the engine and run it at a low idle. The charge pump should immediately pick up oil and fill the system. If there is no indication of fill in 30 seconds, stop engine and determine the cause.

6. After the system starts to show signs of fill, slowly move pump swash plate to a slight cam angle. Continue to operate system slowly with no load on motors until system responds fully.

7. Check fluid level in the reservoir and refill if necessary to the proper level with an approved filtered oil.

8. Check all line connections for leaks and tighten if necessary.

9. The machine is now ready to be put into operation.

10. Frequent filter changes are recommended for the first two changes after placing the machine back into operation. Change the first filter in 3-5 hours and the second at approximately 50 hours approx. hours. Routinely scheduled filter changes are recommended for maximum life of the hydraulic system.

NOTES

Order parts from number XX-XX-XXX Parts Information booklet.

Each order must include the following information.

1. Product and/or Part Number
2. Serial Code Number
3. Part Name
4. Quantity

CHAPTER 5
Transmission

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2.PTO drive system --- 5-1
3.Power train diagrams -- 5-1

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SECTION 1. GENERAL DESCRIPTION

1. WHEEL DRIVE SYSTEM

The wheel driving system is composed of the following major components:

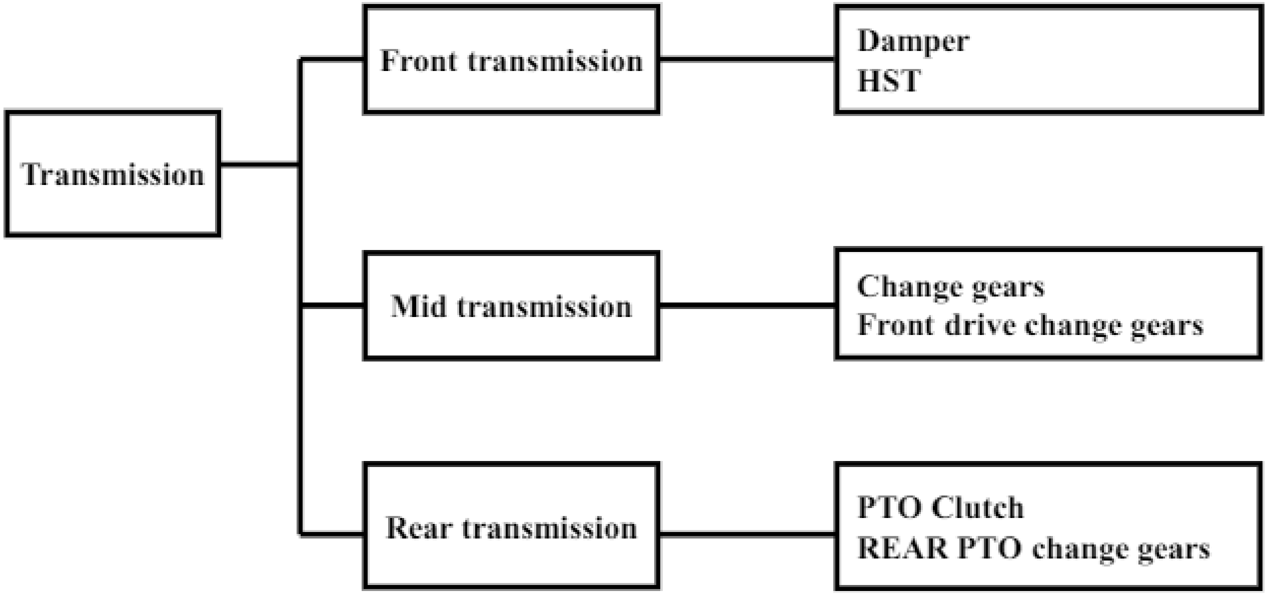


Fig.5-1 Wheel drive system

1) The standard transmission produces 3 speeds forward and reverse : F1 and R1 by reverse change Pedals; 3 speeds by sub-change gears; linear speeds by HST unit.

2. PTO DRIVE SYSTEM

1) The PTO drive system is composed of the hydraulic clutch and the PTO change gears.

2) PTO drive system is composed of MID PTO and REAR PTO, which is referred POWER TRAIN DIAGRAMS

3. POWER TRAIN DIAGRAMS

Refer to page 5-27, 5-28 at the end of this chapter

SECTION 2. SPECIFICATIONS

1. WHEEL DRIVE SYSTEM

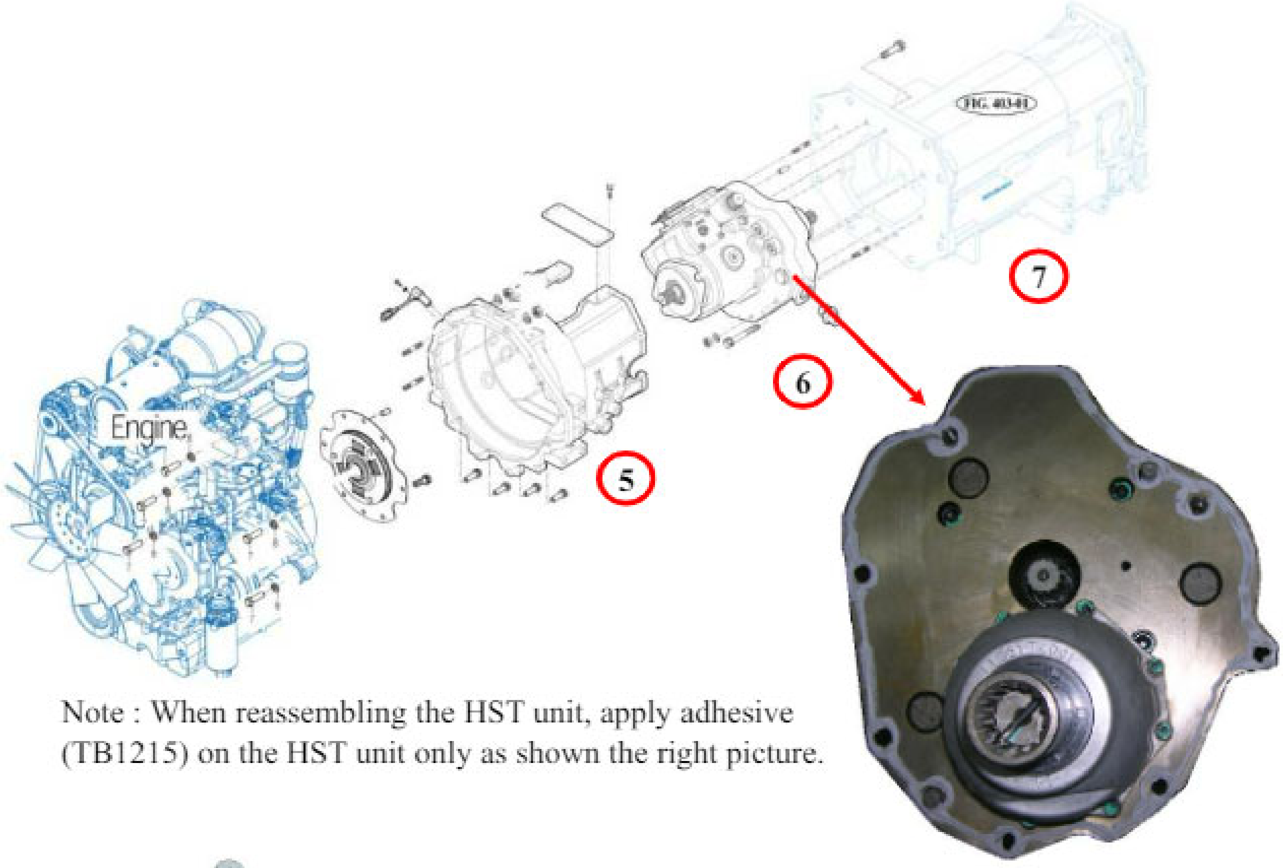
2655 HST			
Speed shift range		Engine rated rpm: 55 / 2300 rpm	
Reduction ratio	Main speed shift	HST	
	Speed range shift	L(Low) M(Mid) H(High)	0.247 (27/23*14/38*20/35) 0.467 (27/23*14/38*27/25) 1.174 (27/23)
	Drive pinion-Wheel gear		0.049 (10/41*11/54)
Operation methods	Main speed shift		Pedal - RH
	Speed range shift		Side shift - LH
Oil capacity	Transmission case	Recommended Oil	THF500
		Capacity	35 ℓ

2. PTO DRIVE SYSTEM

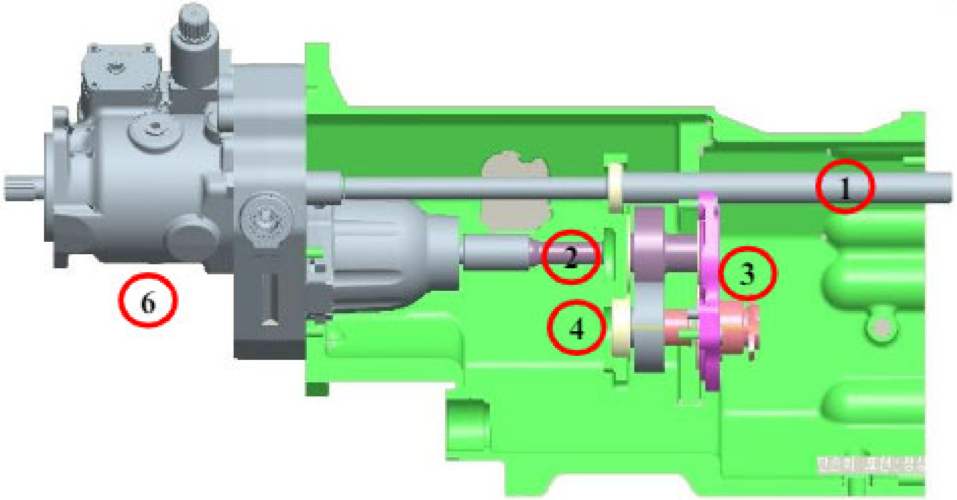
MODEL		2655 HST
TYPE		INDEPENDANT
CLUTCH		Multiple Wet Disk
Rear PTO	Speed shift range	1
	Reduction ratio	0.25(14/56)
	PTO shaft speed	540 @ Engine 2,300rpm
	PTO shaft size	Φ35 mm, 6 straight splines
	Rotation direction	CW viewed from the rear
PTO clutch	Type	Wet, multi-disc, hydraulic-operated clutch
	Number of clutch plates	6
	Used oil	THF500 (In common with transmission oil)

SECTION 3. DISASSEMBLY, INSPECTION, AND REASSEMBLY

1. HST system (Front transmission)



Note : When reassembling the HST unit, apply adhesive (TB1215) on the HST unit only as shown the right picture.



1. Input shaft (PTO) 2. Input shaft (Drive) 3. Input Metal, bearing 4. Drive shaft
5. Front transmission case 6. HST unit 7. Space transmission case

Fig.5-2

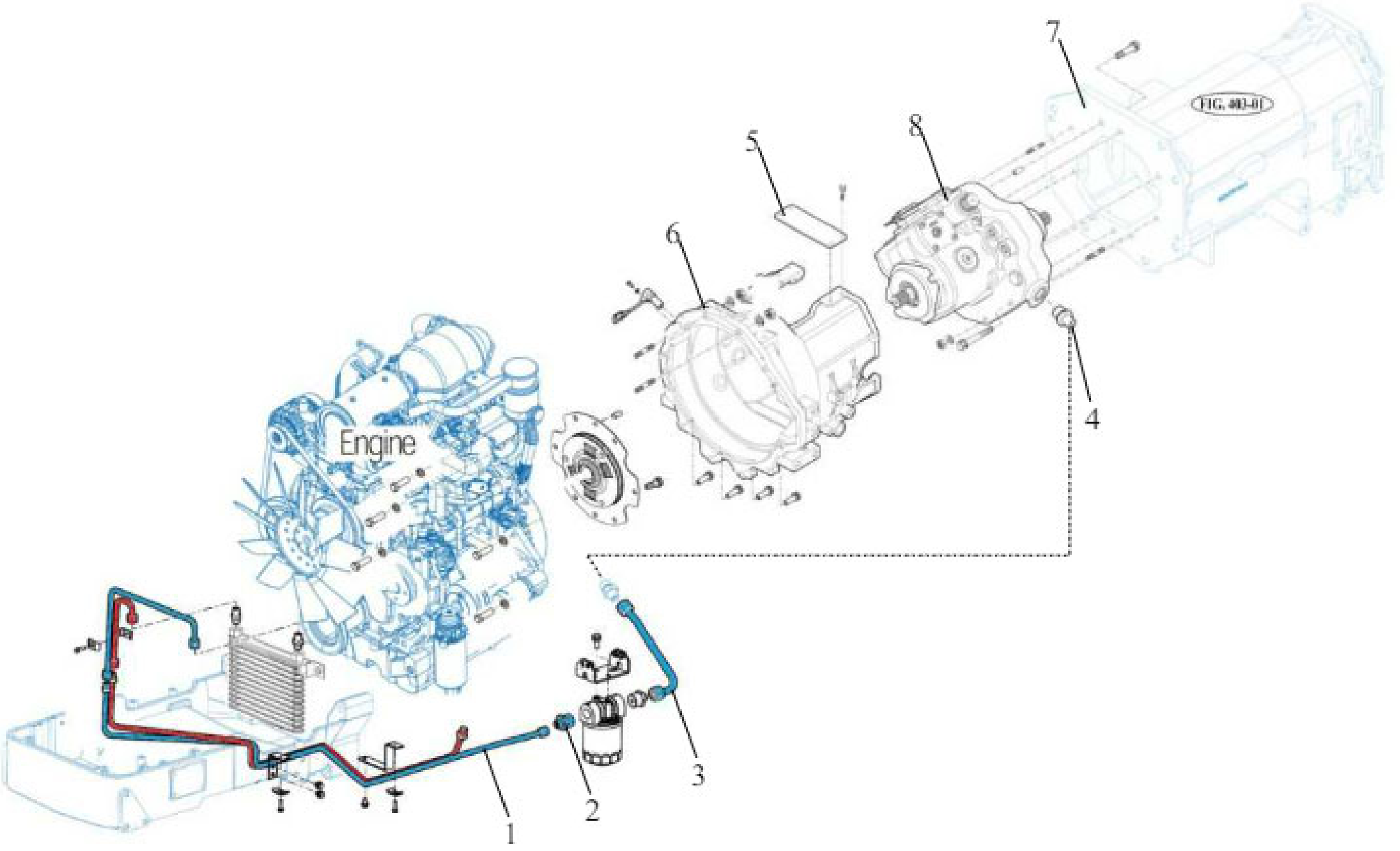
1) Disassembly

(1) Removal of HST system and related parts. Separate the engine from the front transmission referring to the paragraph of SECTION 7. REPAIR in CHAPTER 4.

(2) Disconnect between the pipe(1) and the union(2), the pipe(3) and the union (4) ahead of time.

(3) Remove the cover (5) and then separate the front transmission(6) from the mid transmission(7).

(3) Remove the HST unit(8).



1.Pipe Comp, Cooler OUT2
2.Union (PT1 , M18)
3.Pipe Comp, HST IN
4.Union unit, HST
5.Cover
6.Front Transmission
7.Mid Transmission
8.HST Unit 77122-Ral-02

Fig.5-3

2) Reassembly

Reassemble them in reverse order of disassembly in accordance with the following instruction.

-Installation of clutch damper, HST unit and related parts.

(1) When installing the clutch damper on the flywheel, be sure to install the cotter pin to flywheel.
Note : Pay attention to the direction of installation of Damper.
(2) Apply a thin coat of molybdenum disulfide-based grease (Three bond TB1901 or equivalent) to revolving or sliding parts prior to reassembly.
(3) When installing the clutch damper on the flywheel, take care not to damage this clutch damper.
(4) Apply an ANTI RUST 720S or equivalent after installing clutch damper in order to prevent from rust.
(5) Install the HST unit to the mid transmission case.
Note : Adhesive must be applied on the matching part.
Pay attention to the alignment of the coupler.
(6) Install the front transmission case to the mid transmission case.
(7) Install the cover on the front transmission case.

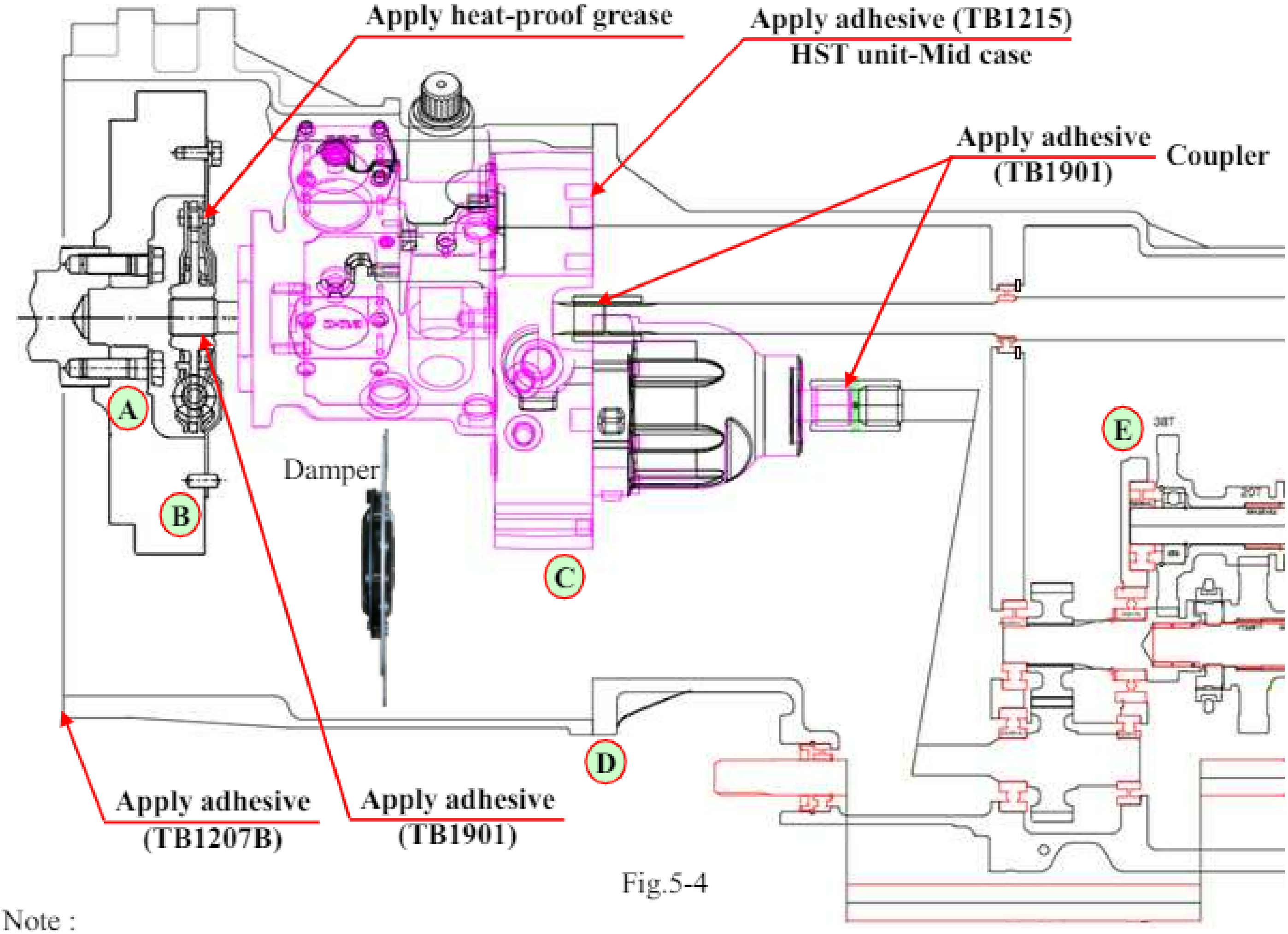


Fig.5-4

Note :
(A) Fly wheel : 6-M14x1.5P, 33mm (Special Bolt)
(B) Damper : 6-M8x1.25P, 20mm (Bolt), 3-D10, 22mm (Pin)
(C) HST unit : 2-D10, 22mm (Pin), 2-M10, 90mm (Stud bolt), 2-M10, 35mm(bolt), 3-M10, 85mm (bolt)
(D) Housing : 7-M14x2.0P, 45mm (Bolt), 2-M14x2.0P, 40mm (Stud bolt)
(E) Input metal : 2-D10, 22mm (Pin), 4-M10, 35mm

2. Mid transmission

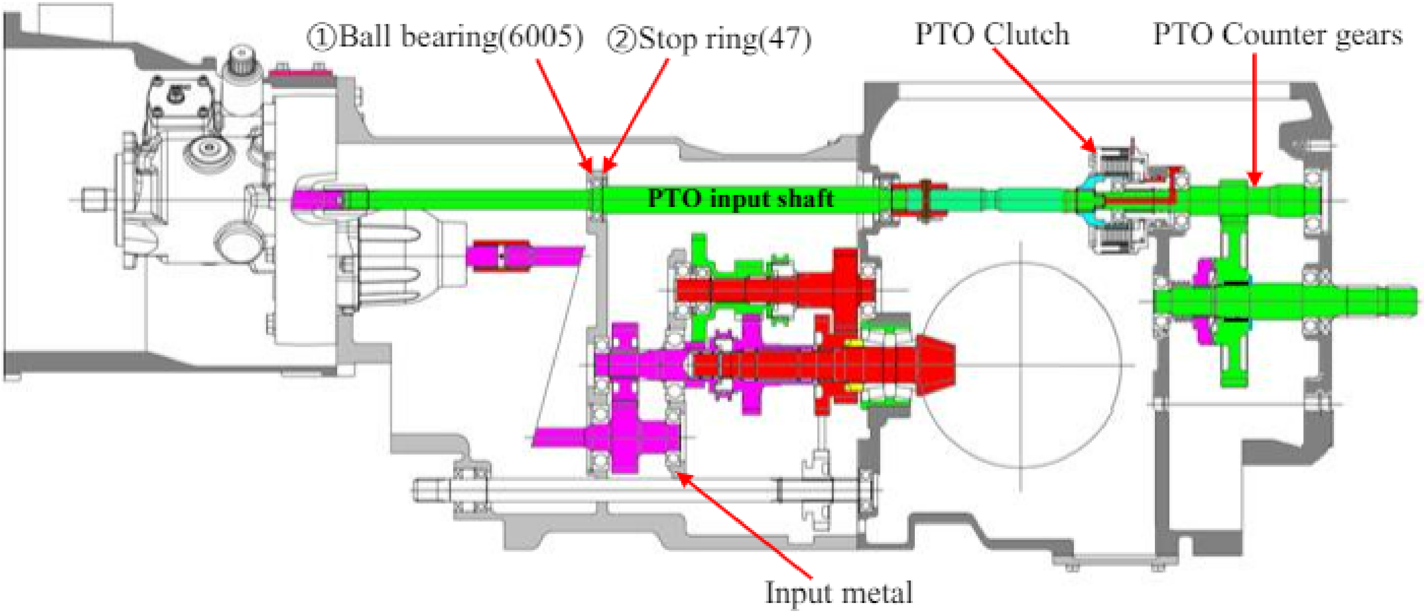
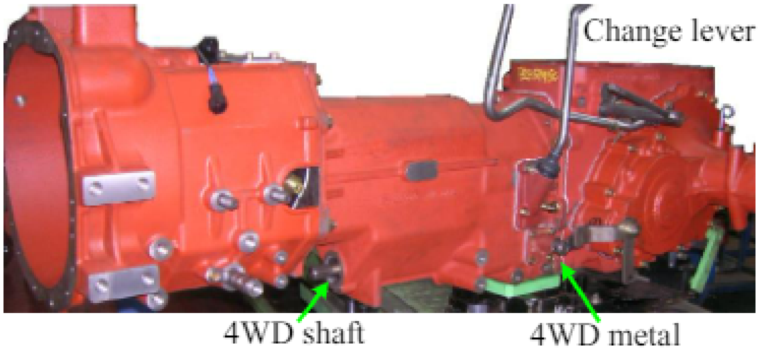


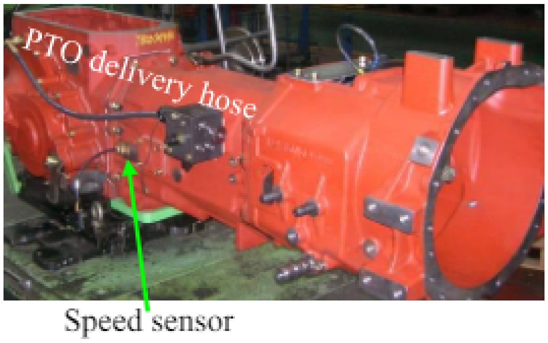
Fig.5-5

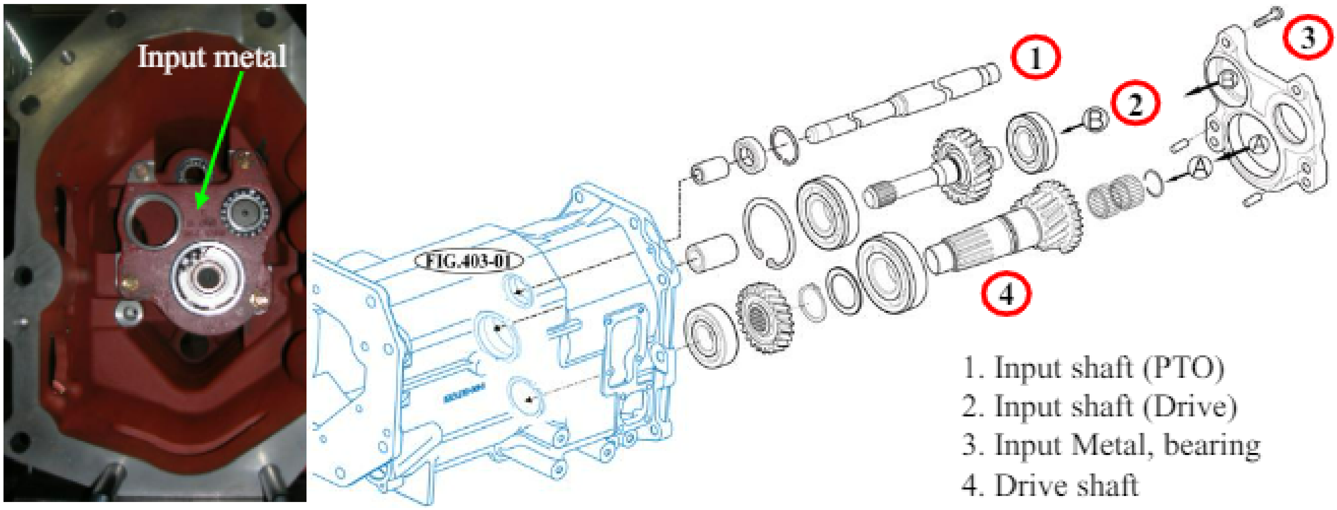
1) Disassembly

(1) Separate the mid trans mission from the rear transmission.
(2) Remove the change lever assembly, 4WD metal, PTO delivery hose and speed sensor.
(3) Remove bolts and nuts.
Note : Clean the 4WD shaft around ahead of time.

(4) Take out the PTO input shaft and 4WD shaft.
(5) Remove the input metal and the change gears.







1. Input shaft (PTO)
2. Input shaft (Drive)
3. Input Metal, bearing
4. Drive shaft

Fig.5-6

(6) Remove the guide, the fork and stay.
(7) Remove the range gears.

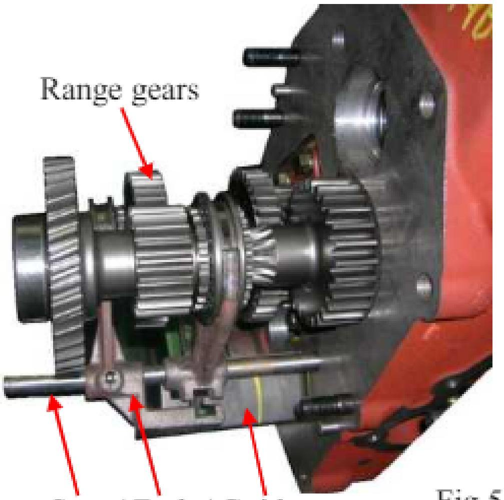


Fig.5-7

(8) Remove the pinion metal tightening bolts and take out drive pinion and related parts as an assembly.

Note : Be careful not to make a scratch on the drive pinion metal and rear case.

(9) Release the lock of nut and remove the nut.
(10) Push out drive pinion from drive pinion metal on a press.
(11) Remove the bearing from the drive pinion with a special tool.

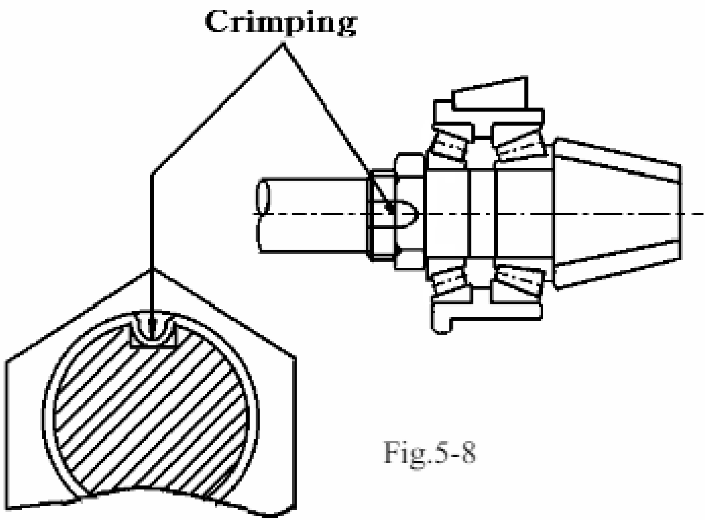


Fig.5-8

2) Inspection

Before and after disassembly, inspect each part for the items mentioned below.
Parts which deviate from the specified values should be replaced.

-Wash all disassembled parts and check them for wear, damage, deformation, Burning , etc.
-Defective parts should be corrected or replaced.
-As the drive pinion and the ring gear make a pair, they should be replaced together even if only one is found to be defective.

-Backlash between the drive pinion and the ring gear

Backlash	0.15-0.25 mm (0.006-0.009 in)

-Backlash between the diff-pinion and the dif-side gear (Reference)

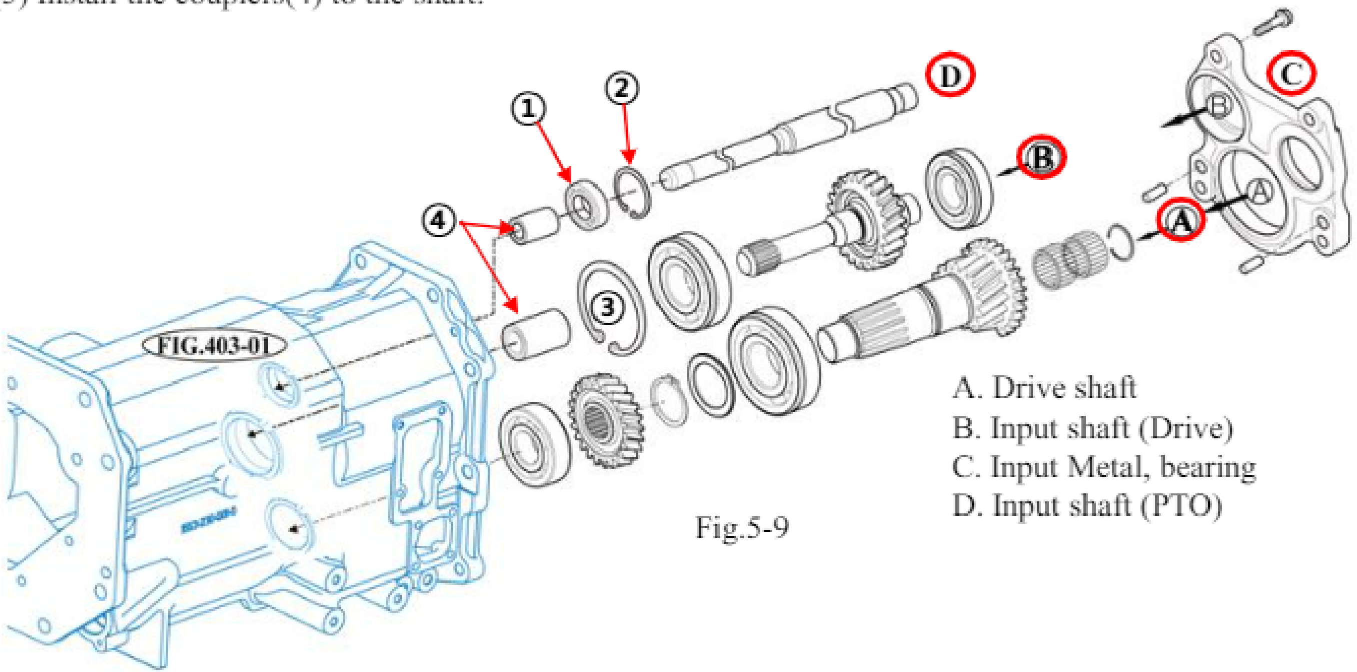
Backlash	0.13-0.2 mm (0.003-0.008 in)

-When the backlash exceeds 0.5mm, also inspect the thrust collar for wear, defective collars should be replaced.

3) Reassembly

Reassemble them in reverse order of disassembly in accordance with the following instruction.

-Installation of the change gears and related parts.
(1) Install the bearing(1), the stop ring(2) and the stop ring(3) to the mid transmission case.
(2) Install the (A) part to the input metal (C).
(3) Install the (B) part (Bearings and Gear) to the input metal (C).
(4) Install the sub-assembled parts to the mid transmission case.
(5) Install the couplers(4) to the shaft.



A. Drive shaft
B. Input shaft (Drive)
C. Input Metal, bearing
D. Input shaft (PTO)

Fig.5-9

(6) Install the sub change gears to rear transmission case. Each A, B, C group should be sub-assembled and then these should be assembled simultaneously to rear transmission.

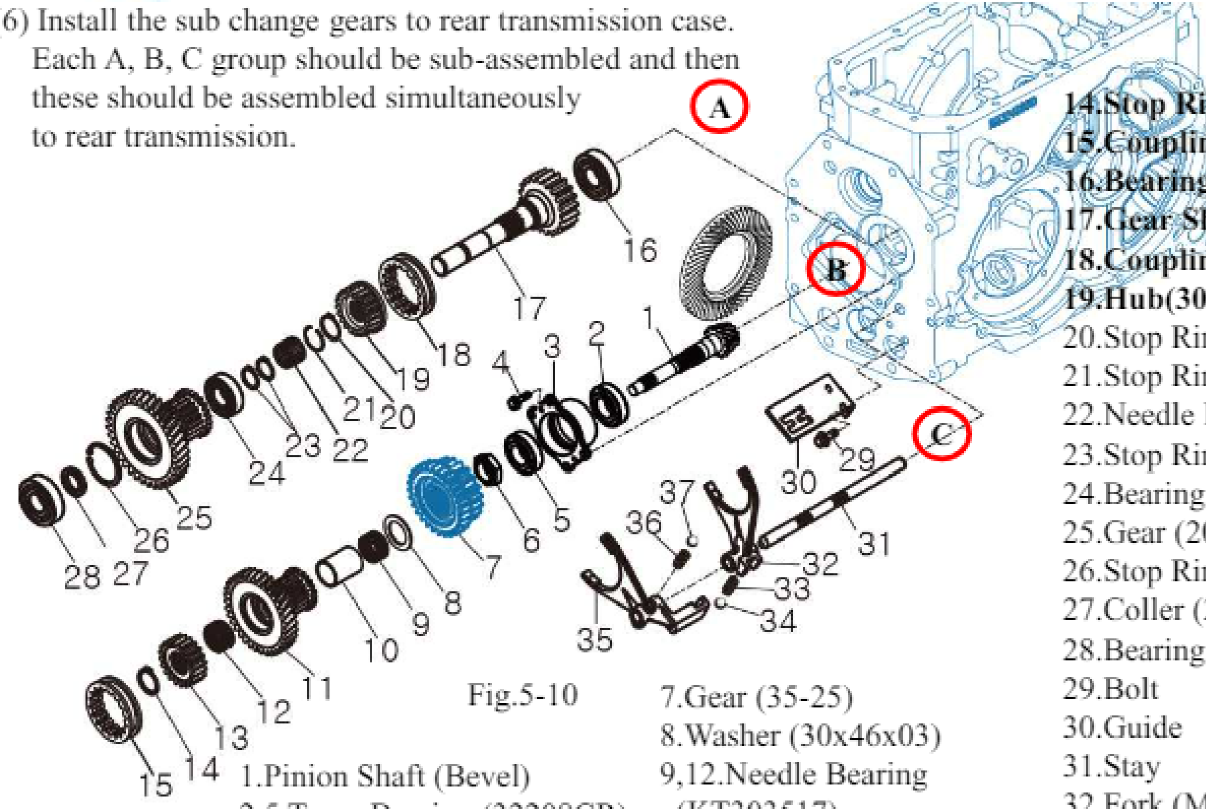


Fig.5-10

1.Pinion Shaft (Bevel)
2,5.Taper Bearing (32208CR)
3.Pinion Metal
4.Bolt (M10-25)
6.Lock Nut (M40x1.5P)
7.Gear (35-25)
8.Washer (30x46x03)
9,12.Needle Bearing (KT303517)
10.Coller (34x1.8x46)
11.Gear (35)
13.Hub (30x62x19)1564
14.Stop Ring (D30)
15.Coupling
16.Bearing
17.Gear Shaft (27)
18.Coupling
19.Hub(30x62x19)1553
20.Stop Ring (30)
21.Stop Ring (AR32)
22.Needle Bearing
23.Stop Ring (25)
24.Bearing (6205)
25.Gear (20-38)
26.Stop Ring (52)
27.Coller (25x36x6)
28.Bearing (6305HL1)
29.Bolt
30.Guide
31.Stay
32.Fork (M-LL)
33,36.Spring (D1.4)
34,37.Ball (5/16)
35.Fork (H-L)

(7) Install the stud bolts to the mid transmission case and rear transmission case.

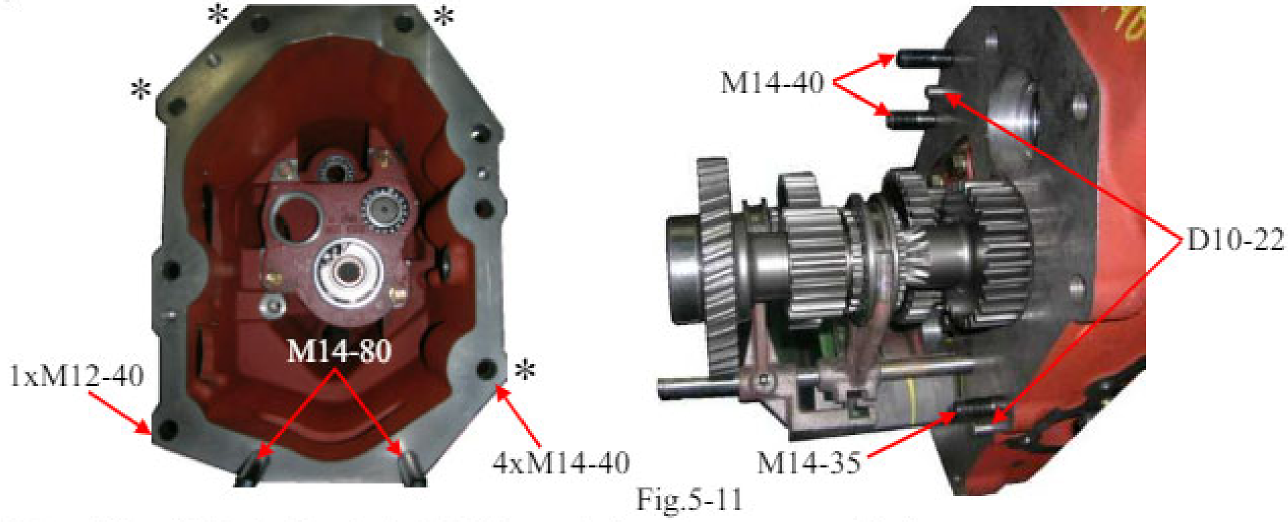


Fig.5-11

(8) Install the 4WD shaft and the PTO input shaft to the rear transmission.

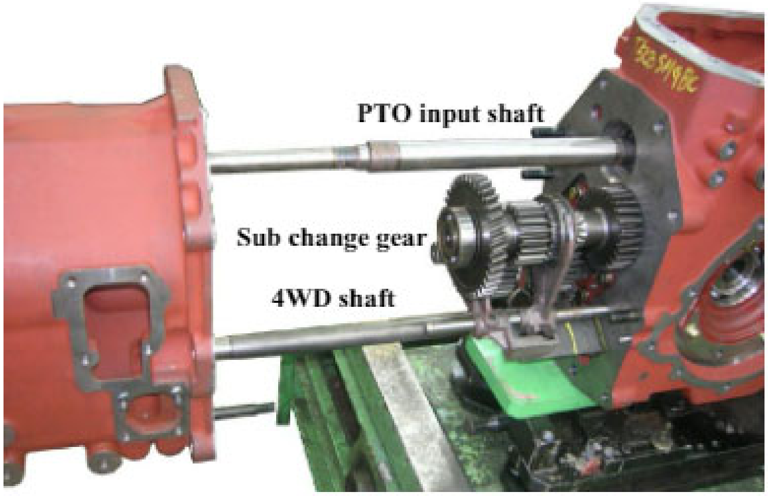


Fig.5-12

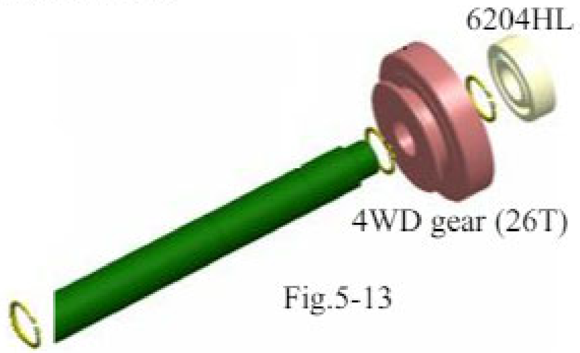


Fig.5-13

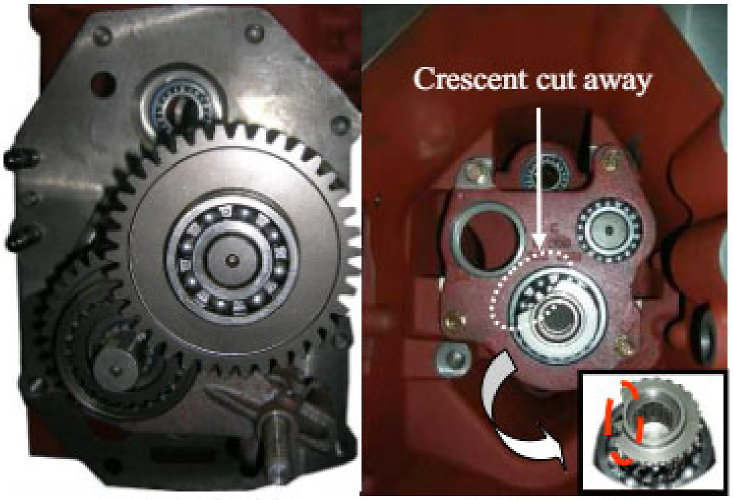
Note :
Pay attention to the direction of the 4WD gear.
And there is "V" marked on the 4WD gear(26T).

(9) Install the 4WD shaft and the PTO input shaft to the rear transmission.

(10) Install the mid transmission assembly to the rear transmission assembly.

Note : Apply the adhesive (TB 1215) on the matching surface ahead of time.

Note : Disengage the shifter link through the opening of the sub change metal (support) and turn the crescent cut-away in the gear upwards.

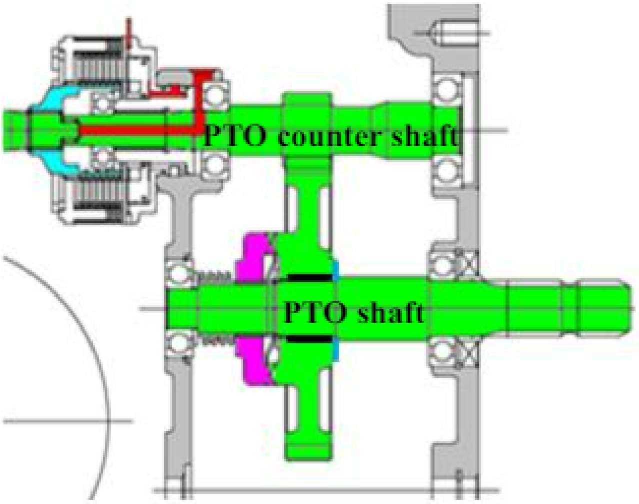


Rear TM side

Mid TM side

Fig.5-14

3. Rear transmission



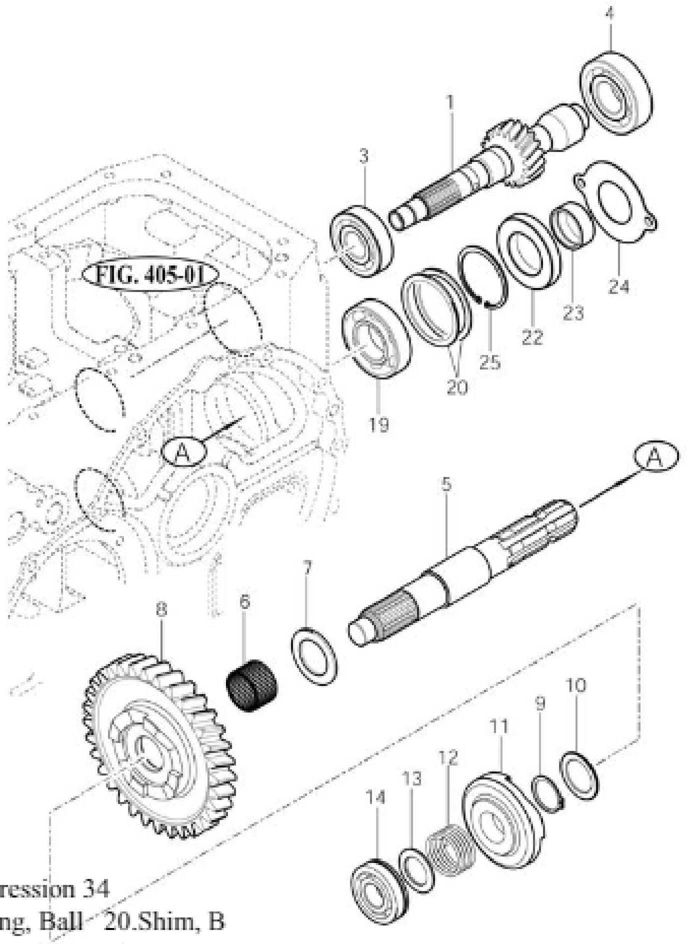
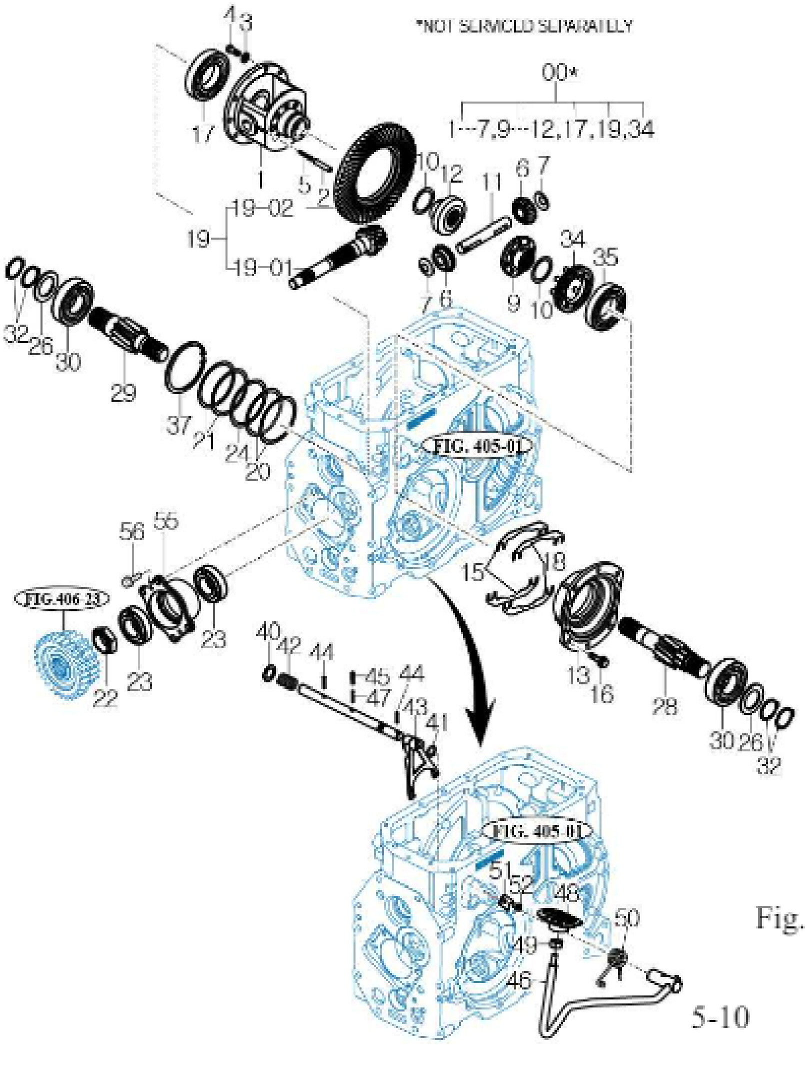


Fig.5-15

1.Gear, Helical 14
3.Bearing, Ball/6305HL1
4.Bearing, Ball/6306HL1 5.Shaft, Output PTO
6.Bearing, Needle Caged 7.Washer, 35X55X3
8.Gear, Helical 56T 9.C-Ring, Shaft
10.Collar, 35X50X2 11.Dog Clutch 12.Spring, Compression 34
13.Washer, 35X46X3 14.Bearing, Ball/6305HL1N 19.Bearing, Ball 20.Shim, B
22.Seal, Oil 23.Sleeve, PTO Shaft 24.Cover 25.C-Ring, Hole



1.Diff case 2.Spring pin
3.Washer spring 4.Bolt Hex fine
5.Pin ,spring 6.Pinion Diff
7.Collar pinion 9.Pinion bevel 16T LH
10.Washer ,thrust 11.shaft diff pinion
12.Pinion bevel 16T RH
13..Metal diff case LH
15.Shim B (t=0.2) 16.Bolt
17.Bearing ball 18.Shim A (t=0.1)
19.Gear set 10-41T 20.Shim 0.1
21.shim 1.0 22.Nut,M40 P1.5
23.Bearing taper roller 24.Shim 0.2
26.Collar,thrust 45X68X4
28.Pinion LH Helical 11T
29.Pinion RH Helical 11T
30.Bearing Ball 32.C-ring
34.Sleeve 35.Bearing Ball
37 C-ring 39.Shaft,Diff Lock
43. Fork Diff lock 46.Pedal Diff lock

Fig.5-16

1) Disassembly

Note : Separate the hydraulic cylinder case from the rear transmission referring to the paragraph 7 of SECTION 3. SEPARATION OF MAJOR COMPONENT in Chapter 2.

(1) Remove the hydraulic cylinder assembly.
(2) Remove the rear axle housing (LH, RH)

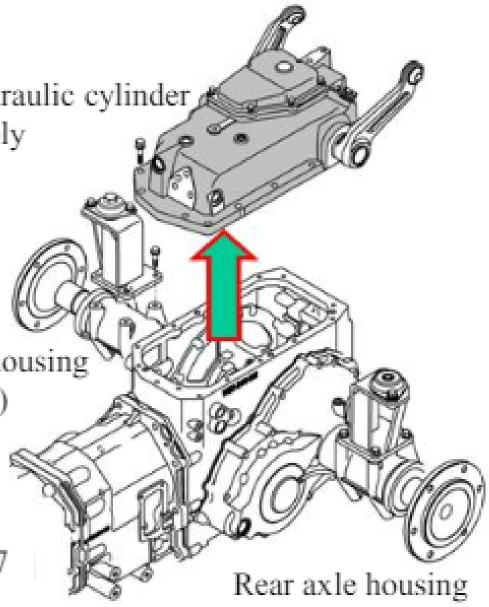


Fig. 5-17

(3) Remove the tension spring.
(4) Remove the spring pins.
(5) Take out the Pin after removing splitting pins.
(6) Remove the PTO shaft and clutch assembly.

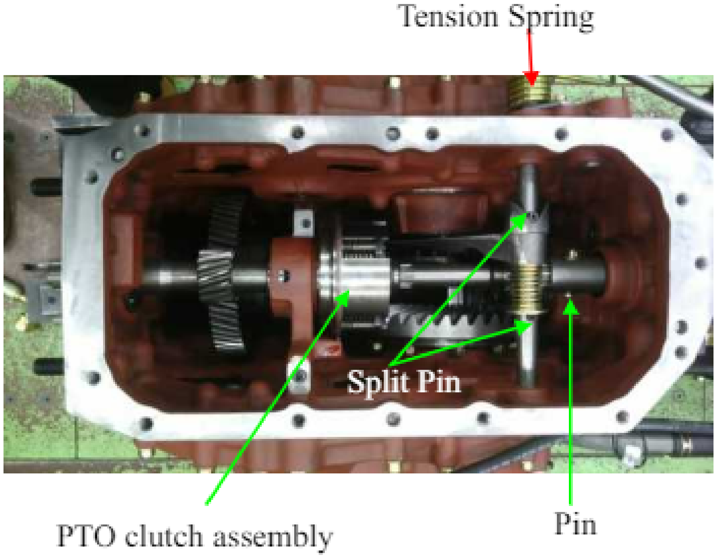


Fig. 5-18

Note : Be careful not to damage the seal ring of the PTO clutch assembly. When the PTO clutch assembly is trouble-free, keep it aside, without disassembling it, in a clean, dust- free place.

(7) Remove the Metal Diff. LH and stop ring RH.

(8) Remove the ring gear as a set.

(9) When disassembling the ring gear set, remove bearing with a puller.

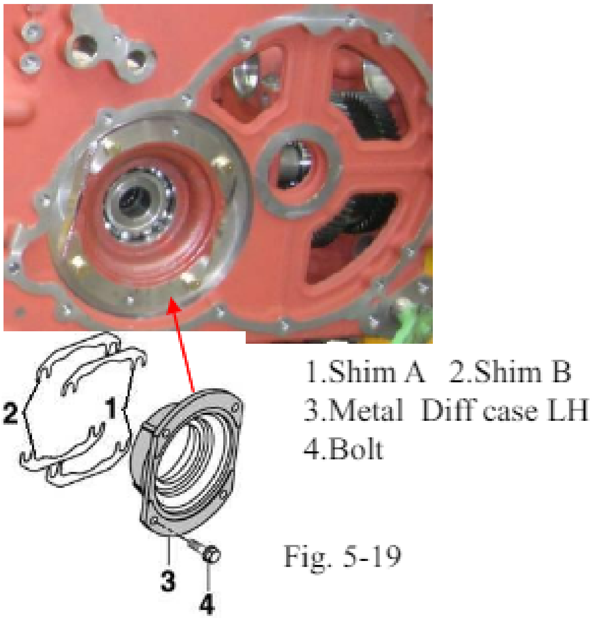


Fig. 5-19

Note : The number of installed shims should be written down or memorized for later reference.

(10) Remove the seal cap in the PTO counter shaft.
(11) Remove the PTO counter shaft rearwards.
(12) Remove the seal.
(13) Pull out the stop ring.
(14) When removing the PTO drive shaft rearwards, grab the PTO drive shaft with one hand, the other hand grabs the related parts, and take out the sub-assembled part bit by bit.

Note : Be careful not to fall down gears to the bottom of the rear transmission case.

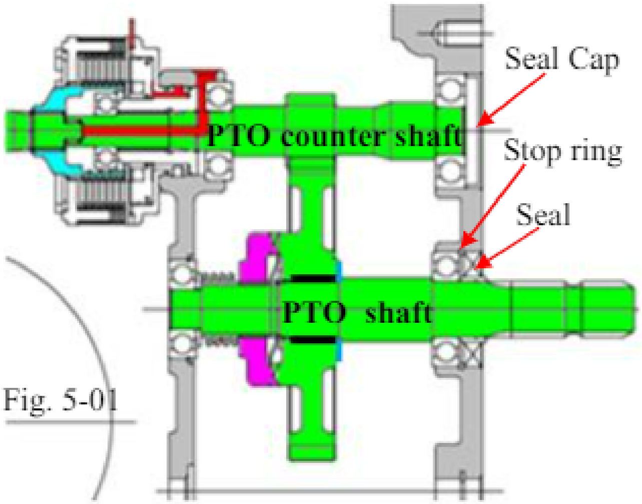


Fig. 5-01

2) Inspection

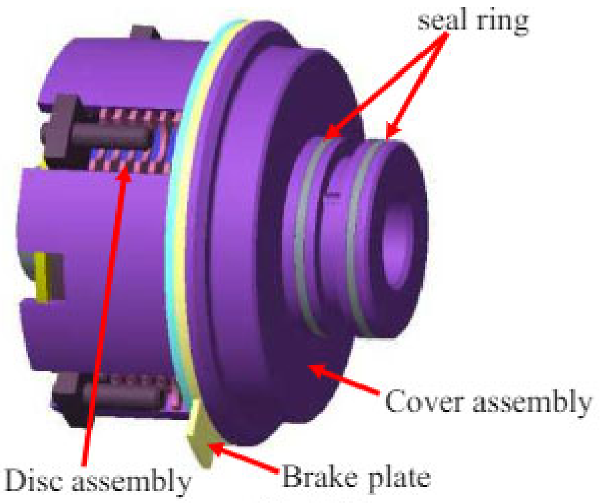


Fig. 5-21

(1) Cover assembly

-Replace a cover assembly which has a damaged or worn sliding surface.

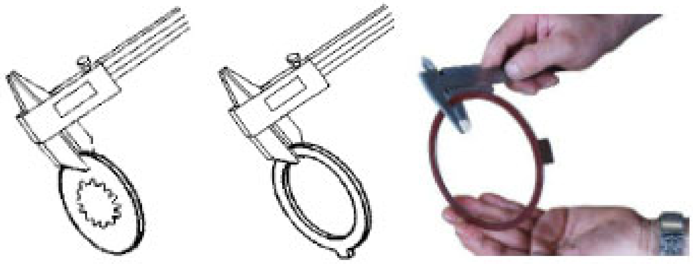
-If there is any damage to the cover assembly and the piston seal ring. These parts should be also replaced.

(2) Disc assembly

-If the thickness of a disc assembly exceeds the usable limit mentioned below or combined width of the disc assembly and driven plate is less than 28.8mm(1.13) in), replace both the disc assembly and driven plate.

-Inspection for disc thickness and serration wear.

Inspection Items	Specified values	Usable limit
Disc thickness	2.6±0.1mm (0.102 in) (7pcs)	2.4mm (0.094 in)
Surface flatness	-	0.2mm (0.008 in)



PTO Disc PTO Plate PTO Brake

Fig.5-22

(3) Driven plate

-Inspection for deformation and burning.

-A seriously damaged or worn disc should be replaced.

Inspection Items	Specified values	Usable limit
Plate thickness	1.6 ±0.05 mm (6pcs)	1.5mm (0.059 in)
Surface flatness		0.15mm (0.006 in)

(4) Brake disc

-Inspection for deformation and burning.

-A seriously damaged or worn disc should be replaced.

Inspection Items	Specified values	Usable limit
Disc thickness	3±0.1mm (0.118 in)	2.7 mm (0.11 in)
Surface flatness	-	0.2mm (0.007 in)

(5) If the combined thickness of the return plate and brake disc deviates from the specified value, replace both parts.

Inspection Items	Specified values	Usable limit
Combined thickness of return plate and brake disc	5.5 ±0.16mm (0.217 in)	5.1mm (0.2 in)

(6) Also inspect other parts for wear and deformation and replace them if necessary.

Note : Seal ring and the two seal rings should be replaced as a pair

3) Reassembly

Reassemble the parts in reverse order of disassembly, following these instructions.

Note :

-Each parts should be washed before reassembly.

-Apply multi-purpose quality grease to the needle bearings in advance.

-Each bolt and nut should be tightened to the respective specified torque table.

-Every time a gear is installed, its smooth rotation should be checked.

-Every stop ring (Snap ring) should be seated securely in its groove.

-Remember to install the stop rings (Snap rings).

-Before and after disassembly, inspect each part for the items mentioned below.
Parts which deviate from the specified values should be replaced.

-Wash clean all disassembled parts and check them for wear, damage, deformation, Burning , etc.
Defective parts should be corrected or replaced.

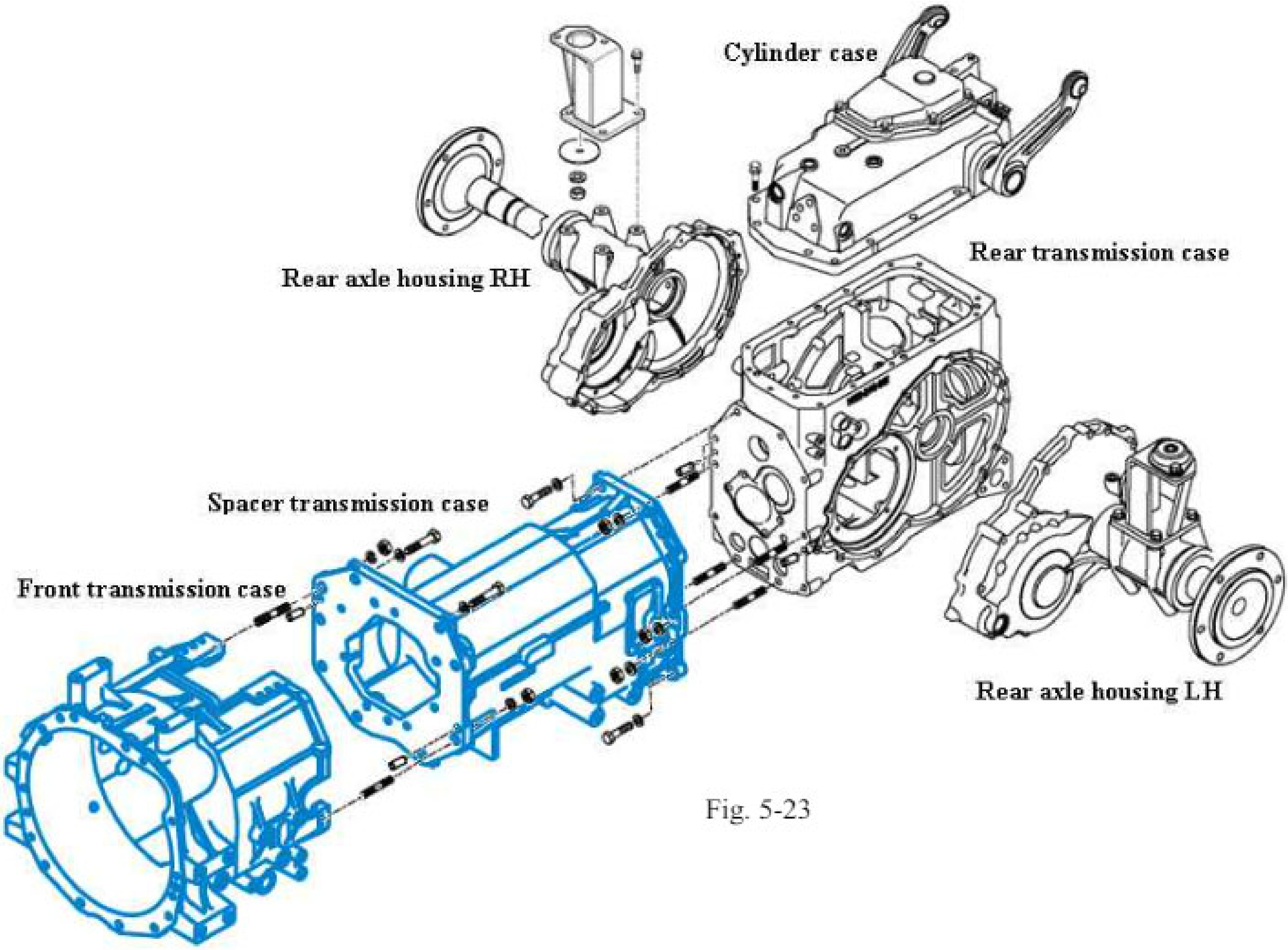
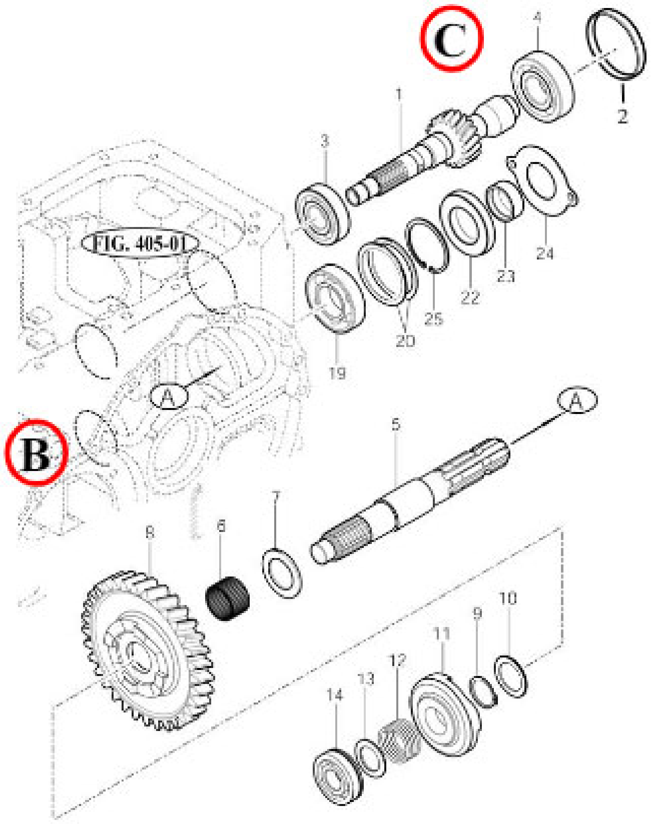


Fig. 5-23



1	Gear , Helical 14	
2	Cap, 72	
3	Bearing, Ball/HL1	6305HL1
4	Bearing, Ball/HL1	6306HL1
5	Shaft Oupput PTO	
6	Bearing, Needle Caged	
7	Washer, 35X55X3	
8	Gear, Helical 56T	
9	C-ring, Shaft	35
10	Collar, 35X50X2	
11	Dog Clutch	
12	Spring. Compression 34	
13	Washer, 25X46X3	
14	Bearing, Ball/HL1	6305HL1N
19	Bearing, Ball	
20	Shim, B	
22	Seal, OIL	TC6Y417211
23	Sleeve, PTO Shaft	
24	Cover	
25	C-ring, Hole	72

Fig. 5-24

(1) Install the bearing(6305HL1N) (14) to “B” part.

(2) While holding the PTO drive shaft(5) with a hand, install the “A” part order and then PTO drive shaft should be securely seated on the bearing.

(3) Install the bearing (19) on the PTO drive shaft and install the stop ring (25).

(4) The shim (20) should be put when it is set without the gap between the bearing(19) and the stop ring(25).

(5) The seal(22) should be coated with an adhesive (TB1215) on the circumference before installing.

(6) Install the oil seal on the PTO shaft, paying attention to its installed direction.

(7) After installation, the sleeve(23) should smoothly slide.

(8) Install the “C” part(1, 3, 4) toward the mid transmission from rear side after those should be sub-assembled.

(9) Install the cap (2) after applying an adhesive (TB1215) on the circumference as shown below.

Note : The snap ring C should be securely seated in the groove and the press-processed side turned towards the outer side.
When installing the oil seal to the PTO sleeve, take care not to damage it or allow to fall.

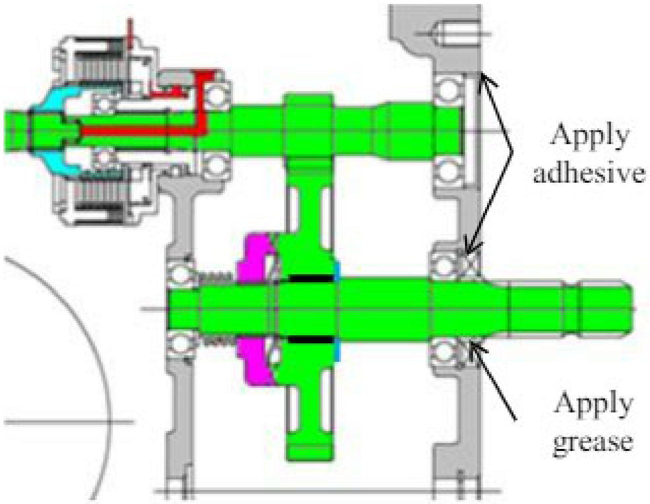
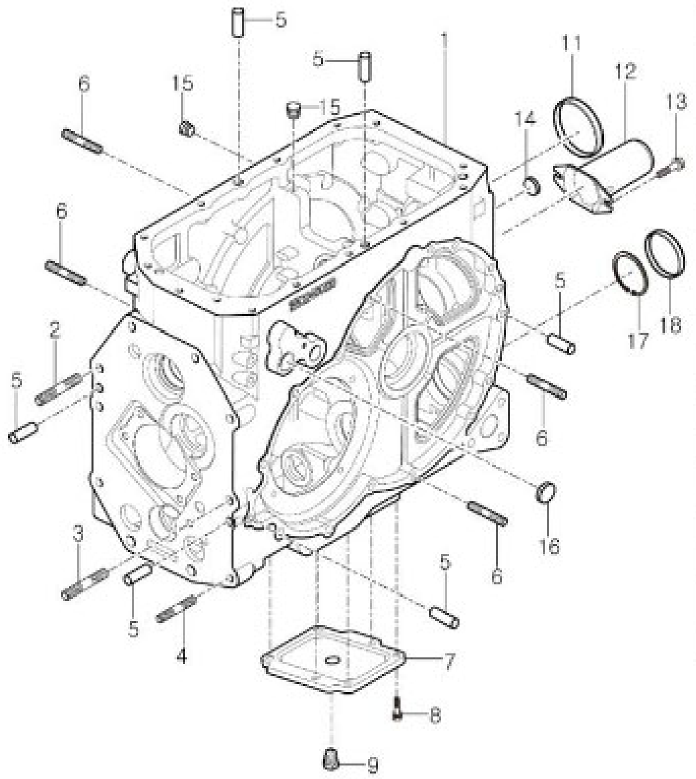


Fig.5-25



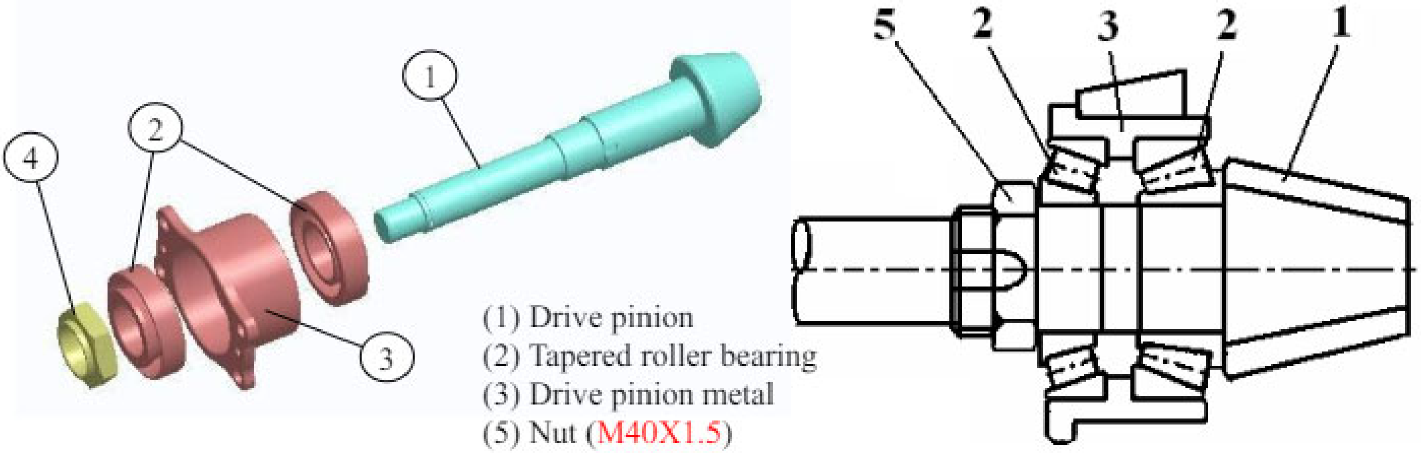
1	Case, Rear	
2	Bolt, Stud/2	M14X40
3	Bolt, Stud/2	M14X35
4	Bolt, Stud/2	M12X40
5	Pin, Parallel/A	10X22
6	Bolt, Stud/2	M10X50
7	Cover, MID PTO	
8	Bolt, Hex/S	M8X25
9	Plug Assy, Drain (Magnet)	
11	Cap, 72	
12	Cap, PTO Shaft	
13	Bolt, Hex/SP	M8X16
14	Seal, Oil A	
15	Plug, Hex-Socket	PT1/8
16	Seal, Oil B	
17	C-ring, Hole	62
18	Cap, 62	

Fig. 5-26

(10) Install the plug (15) on the rear case after applying the sealant on the thread.

(11) Apply the adhesive on the circumference before installing the cap(11, 18).

Tightening torque (M40x1.5pitch)	1.4 Kgf.m (9.36 ft.lbs)



(1) Drive pinion
(2) Tapered roller bearing
(3) Drive pinion metal
(5) Nut (M40X1.5)

Fig.5-27

(12) Apply TM oil to the drive pinion and related parts ahead of time.

Then install them and tighten the assembly with nut (M40x1.5) to the specified torque.

(13) Be sure that the starting torque of the drive pinion meets the specified level.

Starting torque	0.11-0.13 Kgf.m (0.792-0.936ft.lbs)

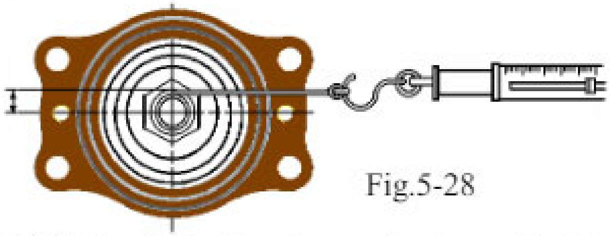


Fig.5-28

(14) After the starting torque has been adjusted to the specified level, crimp the lock of the nut at one point as illustrated.

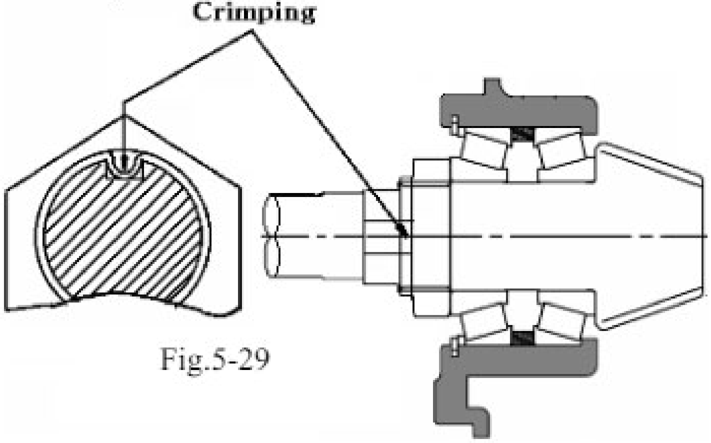


Fig.5-29

(15) Tighten the drive pinion metal by providing it with the same shimming thickness that it had when it was disassembled.

When the drive pinion or the ring gear has been replaced, the proper number of shims to be installed should be determined based upon the following procedure:

Drive pinion metal tightening torque	4.5-6 Kgf.m (32.5-43.5ft.lbs)

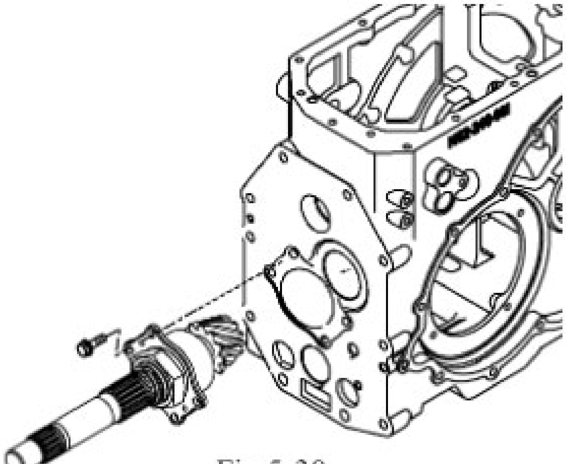


Fig.5-30

(16) Install the differential gears and then install the diff. assembly.

(17) The Backlash between diff-pinion and dif-side gear should be within as range of 0.15 to 0.25mm (0.006-0.009 in) and these parts should turn smoothly.

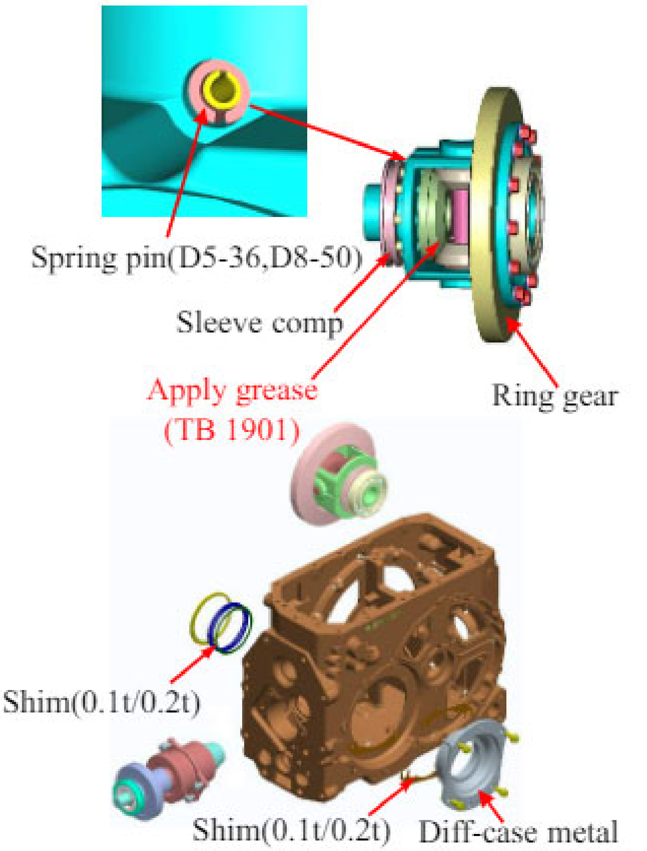


Fig.5-31 diff gear comp.

Ring gear tightening torque(M10x1.5-25)	6.5-7.2 Kgf.m (47 ~ 52 ft.lbs) Apply lock-tight
Diff-case metal tightening torque. (M10x1.5-25)	4.5-6 Kgf.m (32.5-43.5ft.lbs)

Note:

- As shown in Fig5-64, there are two kinds of differential side gears. Although are case hardened, the one installed on the side of the diff-lock is treated further and colored black. Take care not to mix them when assembling.
- Apply multi-purpose, quality grease to the parts mentioned below: (Three bond-1901)

• Tooth surfaces of diff-pinions and dif-side gears

• Friction surfaces of diff-pinion shafts and diff-pinions.

Note : When reassembling the used pinion and ring gear, reinstall the same thickness of shims as was installed before disassembly in each shimming position.

INSTALLATION OF A NEW PAIR OR RING GEAR AND DRIVE PINION

A. Use a new pair of ring gear and drive pinion delivered from the manufacturer. Never mix its components with those of other pairs.

Note : Every ring gear-dive pinion pair is adjusted and inspected for tooth contact individually at factory.

B. Adjust the backlash between the ring gear and drive pinion to be 0.15-0.25mm(0.006-0.009 in) by shimming the drive pinion metal and right and left dif-case metal and make sure that their tooth contact is proper

(18) Backlash adjustment between the drive pinion and the ring pair (Fig5-32)

i. As the drive pinion and the ring gear make a pair, be sure not to mate them with other parts from differential tractors.

ⅱ**.** Adjust the shimming to backlash of 0.15-0.25 mm (0.006-0.009 in).
The standard shimming is 0.5mm (0.016 in) on both sides.

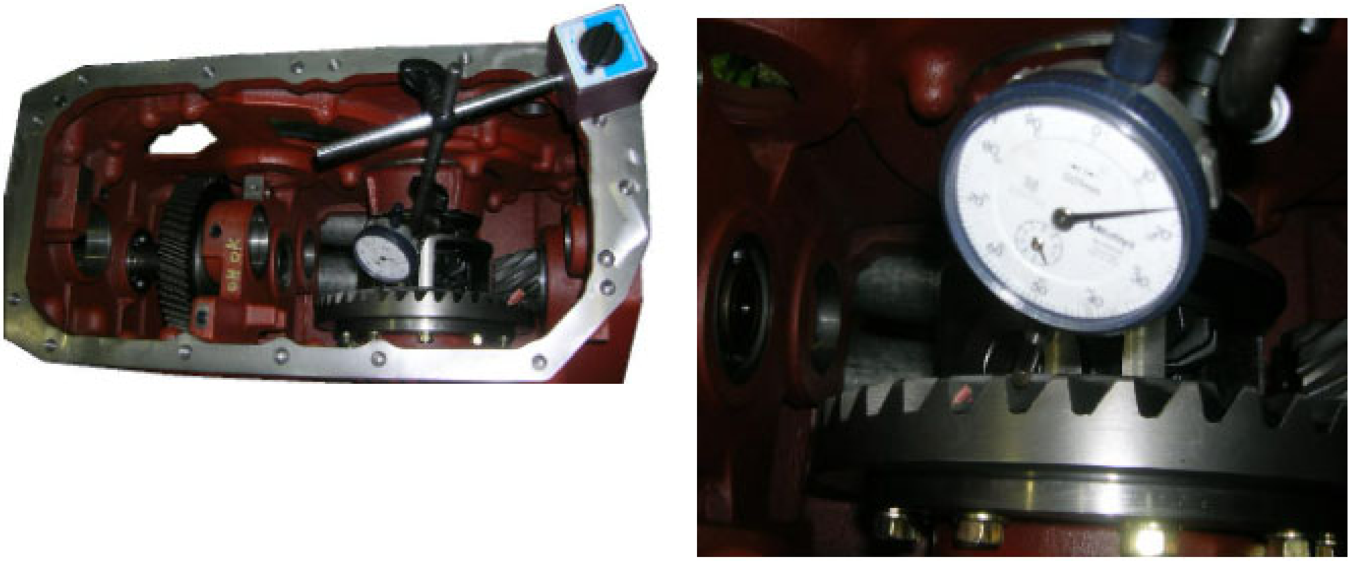
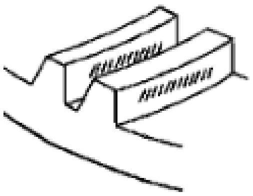
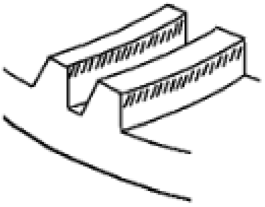
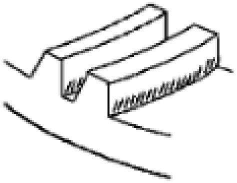
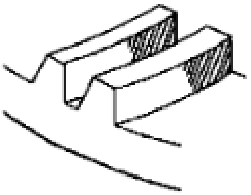
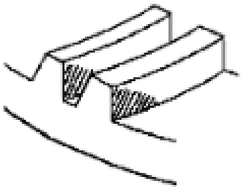


Fig.5-32

Note : Strike the circumference of the ring gear both sides with a copper hammer by turning the ring gear manually, and check to see that the backlash remains unchanged. The backlash should be checked at four points 90 degrees apart to each other.

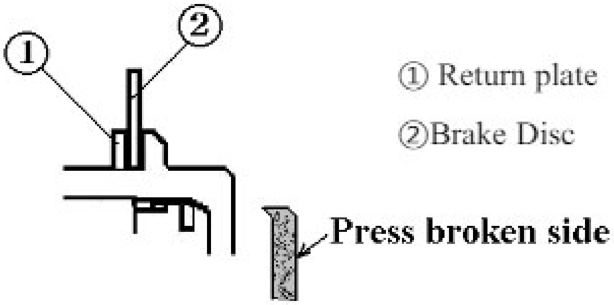
ⅲ. inspection of the tooth bearing

Apply an even coat of oil-dissolved minimum on the drive pinion teeth and turn the drive pinion on the ring gear to check the tooth bearing by observing the bearing traces on the ring gear.

Correct Contact 	When drive pinion and ring gear are meshed correctly with each other and their backlash is within specified range, contact is in middle of ring gear tooth and is approximately 75% of total tooth width.
Tip contact 	Excessive backlash. Move differential case and shims from right side to left side. See ”Assembly and installation”.
Root contact 	Inadequate backlash. Move differential case shims from left side to right side. See ”Assembly and installation”.
Toe contact 	Too little engagement. Remove some drive pinion support shims. See Transmission : REAR TRANSMISSION ASSEMBLY-Setting cone center.
Heel contact 	Too much engagement. Add some drive pinion support shims. See TRANSMISSION:”REAR TRANSMISSION ASSEMBLY-Setting cone center.”

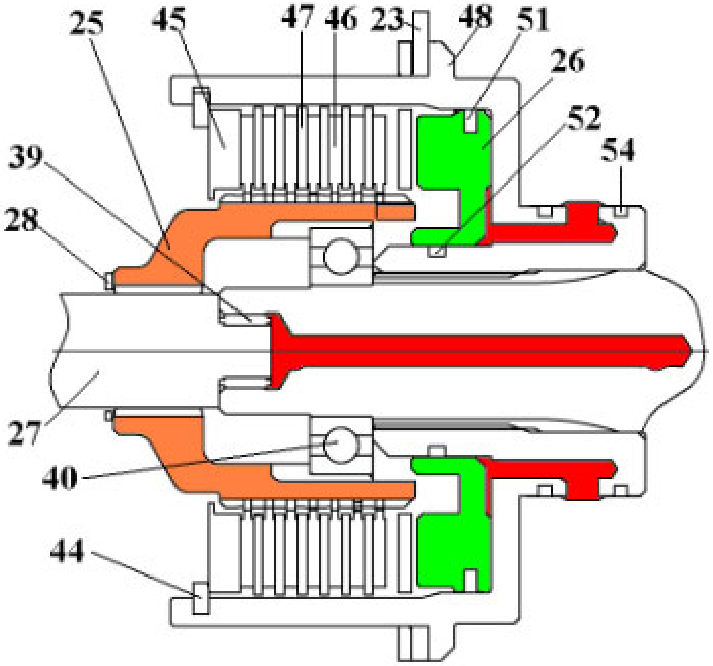
(19) When installing seal rings, apply fresh oil ahead of time and install them carefully so as not to damage them.

(20) Install the return plate with the press-processed side turn towards the brake disc.



① Return plate

②Brake Disc



23. Brake disc 25. Hub 26. Piston 27. PTO shaft
28. Stop ring 39. NB 40. RBB 44. Stop ring
45. Back-up plate 46. Disc assembly 47. Driven plate
48. Cylinder 51. Seal ring 52. Seal ring
53. Cover assembly 54. Seal ring

Fig.5-33

Note : When installing the PTO clutch assembly, apply a thin coat of grease to the seal rings and install it taking care not to damage these rings.

Note : Reassembly of the PTO clutch assembly should be done in a clean, dust-free place. Pay special attention to avoid damage of the seal rings, etc.

(21) When installing the return spring, use a special tool like below picture; the stop ring should be securely seated in the groove.

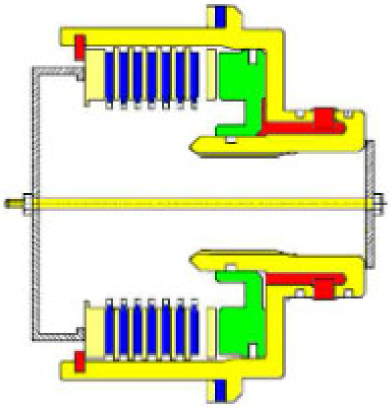
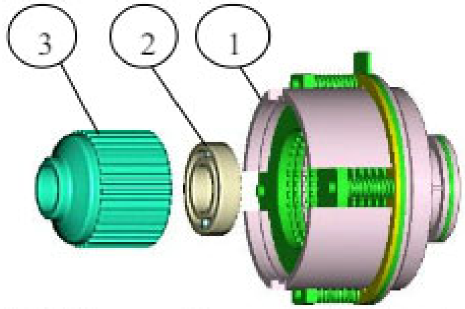


Fig.5-34

(22) When pushing the bearing into the PTO hub, be careful only to push their outer races.

(23) Install the snap ring in correct direction.

(24) After reassembly, check to see that gear turns smoothly by locking the PTO clutch.



① PTO clutch assembly ② Ball bearing
③ PTO hub

Fig.5-35

Note : Be careful not to damage the seal ring of the PTO clutch assembly When the PTO clutch assembly is trouble- free, keep it aside, without disassembling it, in a Clean, dust-free place

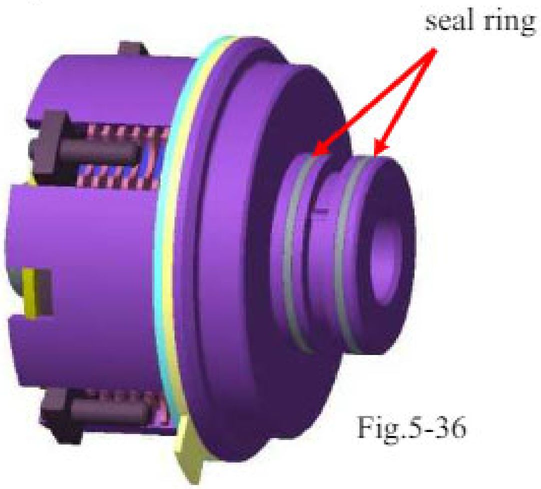


Fig.5-36

(25)Install the C-ring and bearing(2) to the rear case.

(26)Install the PTO clutch assembly to the rear case.

(27)Install the needle bearing, C-ring and the coupling to the shaft(5).

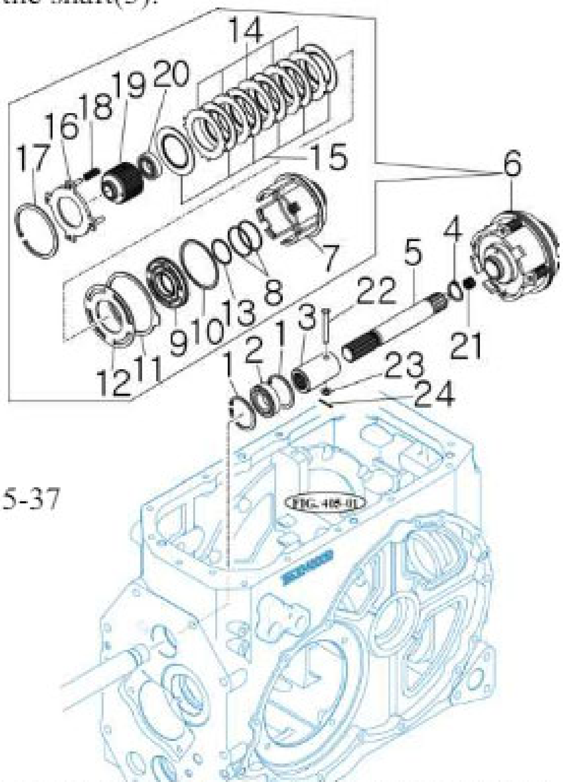


Fig.5-37

1. C-RING, HOLE47
2. BEARING, BALL6005
3. COUPLING, 36X62
4. C-RING, SHAFT
5. SHAFT, INTERMEDIATE
6. CLUTCH ASSY , PTO
7. CASE
8. SEAL , B
9. PISTON
10.SEAL, C
11.DISK, BRAKE
12.PLATE, RETURN
13.RING, PISTON
14.CLUTCH , DISK
15.CLUTCH , PLATE
16.PLATE ASSY
17.C-RING, HOLE
18.SPRING
19.HUB, OUT
20.BEARING, BALL6204
21.BEARING, NEEDLE.ROLLER
22.PIN
23.WASHER, PLAIN
24.PIN, SPLIT(2.5x20)

Note : Make sure that the turning lock of the PTO clutch is securely seated in the groove in the Rear transmission case.

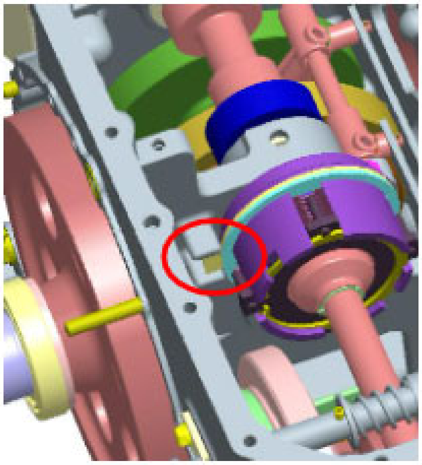


Fig.5-38

(28)Install the diff. lock system.

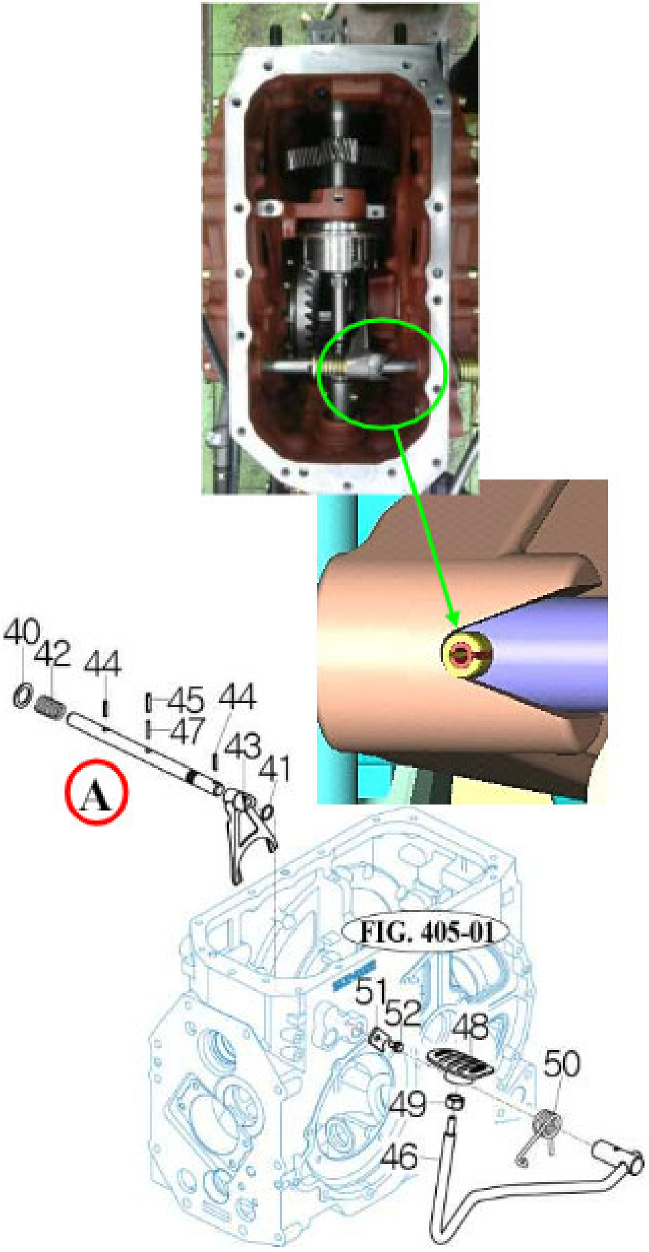
Put the shaft (A) to the rear case and then install the washer, the spring and the fork order to shaft.

(29)Install the O-ring(41) to the shaft.

(30)Install the stop plate in the groove of the shaft and then tighten the bolt(52).

(31)Install the spring pin(45,47) as shown below.

(32)Install the spring pin (44) while the special Jig is holding the spring as shown below.

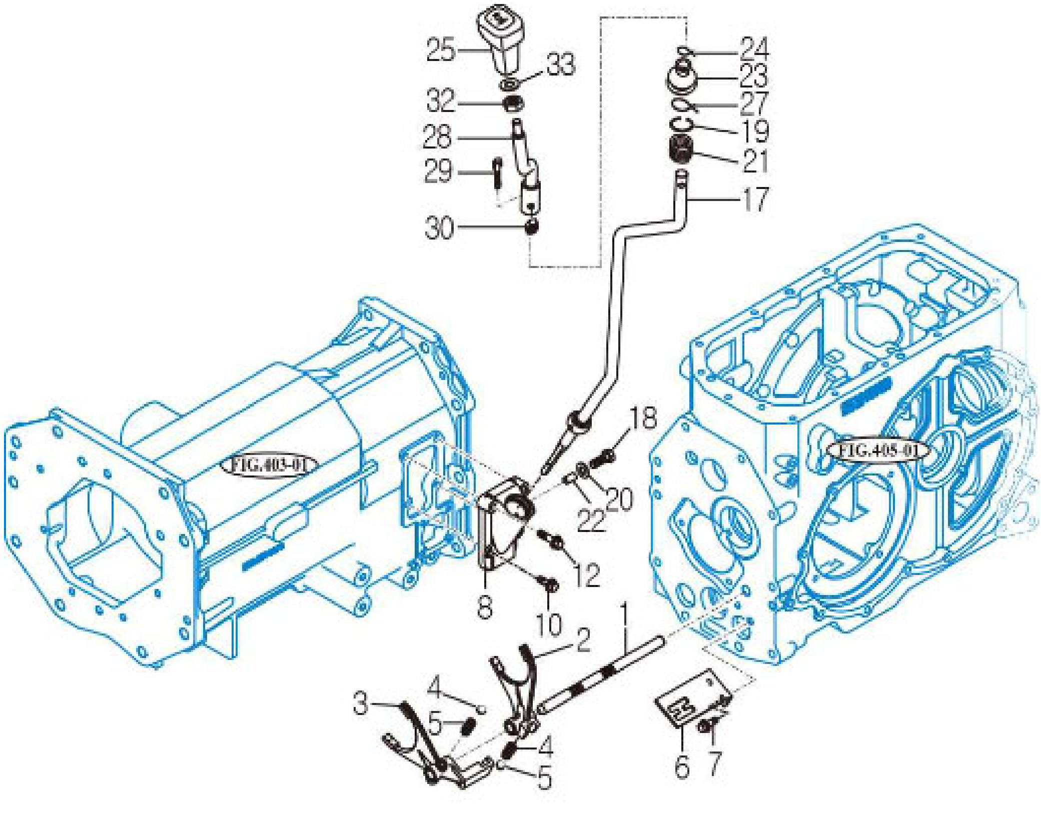


40.WASHER , PLAIN M20
41.O-RING , P16
42.SPRING
43.FORK , DIFF LOCK
44.PIN , SPRING(6x32)
45.PIN , SPRING(8x36)
46.PEDAL COMP , DIFF LOCK
47.PIN , SPRING(5x36)
48.PEDAL COMP,ACCEL
49.NUT , HEX FINE/2
50.SPRING , DIFF PEDAL
51.PLATE , STOP
52.BOLT , HEX/S

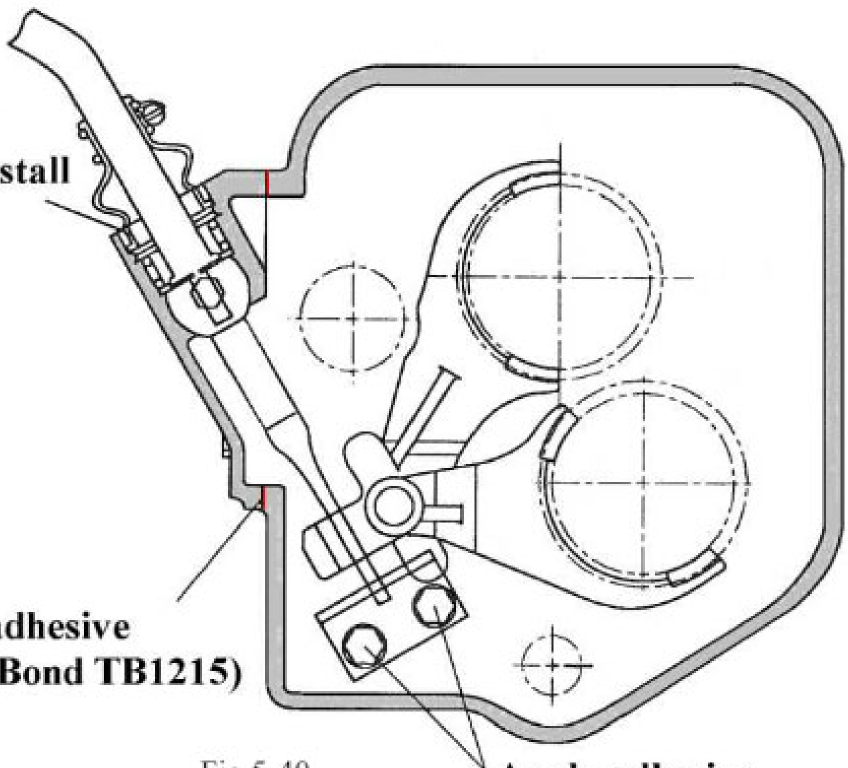
Fig.5-39

4. Shifting levers mechanism

1) Range shift system



1.Stay(shifter, range)
2.Fork(shifter,M-LL)
3.Hook(Shifter,H-L)
4.Steel ball(5/16)
5.Shifter spring
6.Guide
7.Bolt/S (M10-20)
8.Metal (SUB)
10.Bolt (M8-25)
12.Bolt (M8-30)
13.Seal
17.Lever comp.
18.Bolt, drain
19.C-ring (32)
20.Seal
21.Spring
22. Pin (D6-16)
23.Boot
24.Wire, steel
25.Grip, range
27.Wire, steel
28.Lever comp(bar/16)
29.Bolt (M8-35)
30.Nut (M8)
32.Nut(Fine) M10
33.Washer M10



Take care not to install the boot slanted

Apply adhesive (Three Bond TB1215)

Apply adhesive

Fig.5-40

Note : The bottom two tightening bolts should be coated with an adhesive on their threads before being tightened.

2) Front drive change (4 WD shaft) system

1.Shaft,4WD
2.C-Ring,shaft
3.Gear spur 26T,4WD
4.Gear spur 27T,4WD
5.Seal,Oil
6.C-ring D
7.Bearing Ball
8.C-ring,shaft

1.Metal(shifter)
2.Shifter spring
3.Steel ball
4.Bolt
5.Nut
6.Washer spring
7.Arm comp
8.O-ring
9.Arm comp
10.Spring pin
14.Grip,4WD
15.Washer plain
16.Nut
17.Pin
19.Pin,split
20.Rod assy

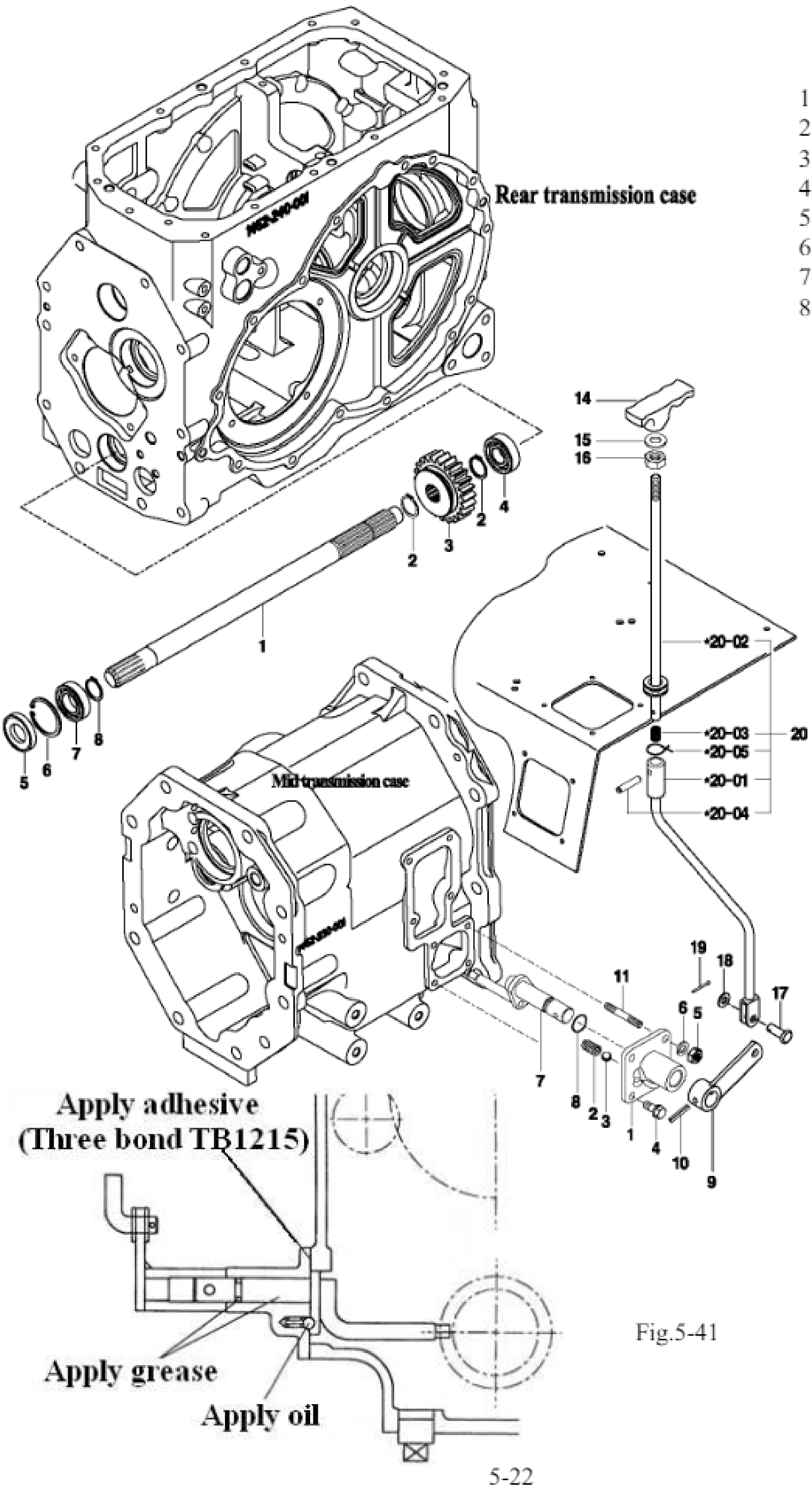


Fig.5-41

5. PRECAUTIONS FOR DISASSEMBLY, INSPECTION AND REASSEMBLY

(1) Disassembly

When drawing a shifter stay from its shifter,be careful not to lose the steel ball.It can jump out of the shifter.

(2) Inspection

-Shifter –disengaging load:

Sub change : **18-22 Kgf (40-49lbs)**

4WD change : **25-29 kgf (55-64 lbs)**

-Usable limit of shifter-disengaging load:

Sub-change : **17 Kgf (38lbs)**

4WD change : **24Kgf(53lbs)**

-Wearing limit of each shifter: **0.5 mm (0.02 in)**

(3) Reassembly

1)lubricate the grooves in the shifters.

2)Each shifter should be installed in the correct direction.

3)When installing the shifter on the shifter stay, Use the special tool as shown in Fig.5-87

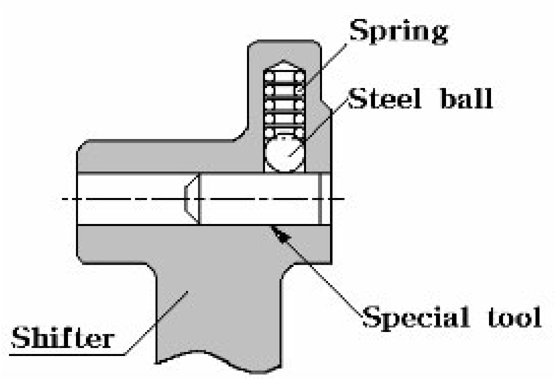


Fig.5-42

SECTION 4. TROUBLESHOOTING

1. WHEEL DRIVE SYSTEM

Problems	Causes	Countermeasures
Transmission makes noise in neutral	Insufficient or improper lubricant	Replenish or replace
	Excessive splines of change shaft, spline hub, etc	Replace
	Worn or broken bearings	Replace
	Slide couplings interfering with the gears due to worn or deformed shifters	Replace
Gears make a noise when shifted.	Improperly disengaged HST unit	Repair or replace
	Wear in width of gears, splined hubs, collars, Potentiometer of the pedal (F/R)	Replace
	Defective Change shift fork	Replace
Gears disengage by themselves	Broken shifter springs in the fork and stay	Replace
	Wear in width of gears, splined hubs, collars, etc	Replace
	Worn shifters	Replace
Gears do not engage or disengage	Improper disengaged shift lever	Repair or replace
	Gears are locked due to foreign matter between them	Remove the foreign matter

2. PTO DRIVE SYSTEM

problem	Causes	Counter measures
PTO does not spin with PTO shifted to ON	PTO shift lever is in neutral	Shift lever positively to ON
	Defective PTO switch	replace
	Clogged PTO valve	Wash clean, Replace
	Poor Pump	Replace
	Defective solenoid valve	Replace
PTO spins but does not produce sufficient torque.	Worn clutch disc	Replace
	Broken or fatigues seal ring at clutch sleeve	Replace
	Clogged the delivery line	Wash clean, Replace
	Poor pump	Replace
	Clogged PTO valve	Wash clean, Replace
PTO does not stop when PTO switch is shifted to OFF	Defective PTO valve solenoid	Replace
	Poor PTO valve (Contamination)	Wash clean
	Broken clutch piston return spring	Replace
	Poor switch	Replace
PTO follows too much when PTO switch is shifted to OFF	Improper oil	Replace
	Insufficient warming up	Let tractor warm up sufficiently
	Poor PTO clutch brake	Replace
	Weak or broken piston return spring	Replace
	Poor PTO valve(Contamination)	Wash clean
	Deflected clutch plate	Replace

3. Power train diagram

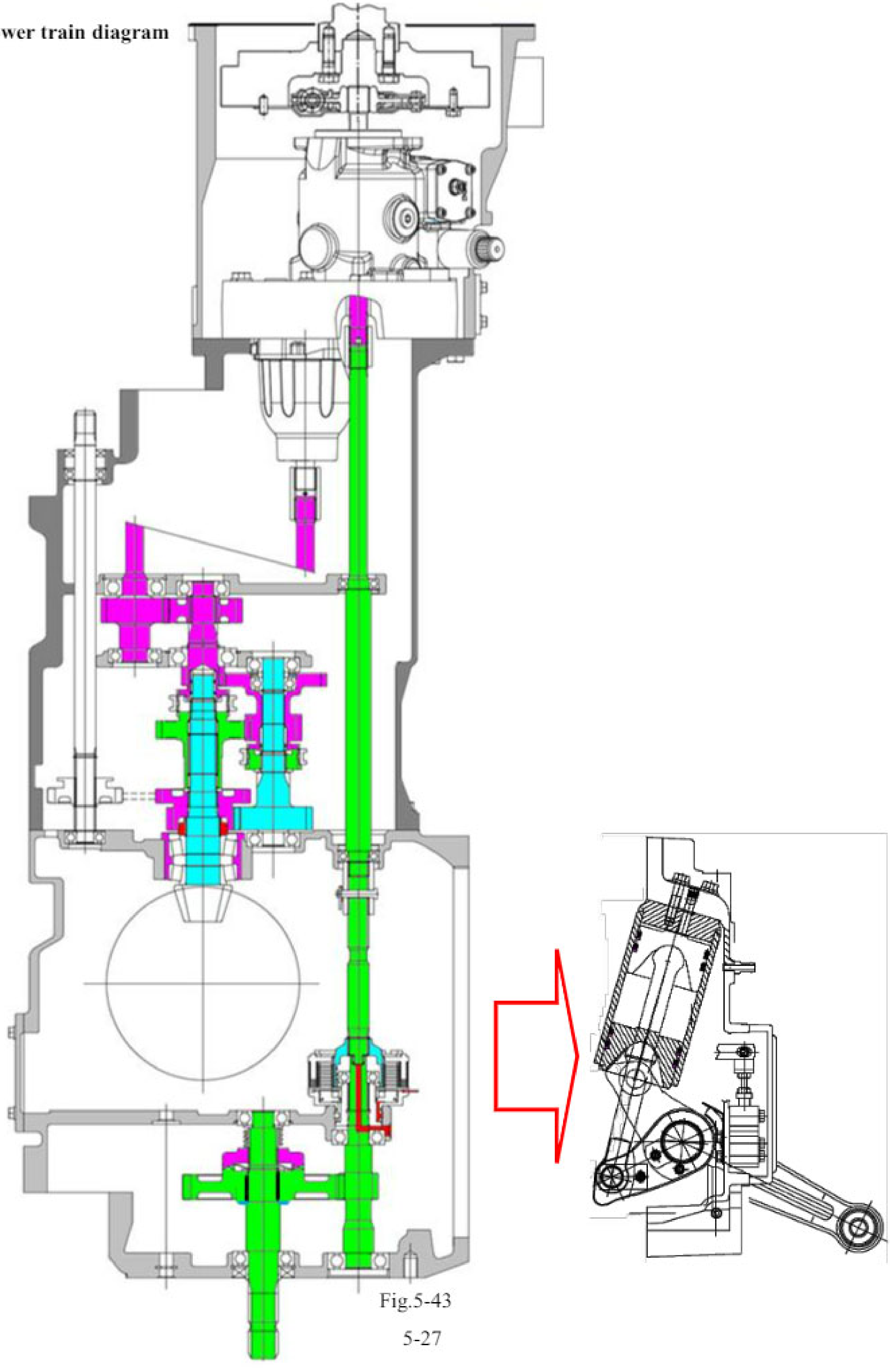


Fig.5-43

CHAPTER 6. FRONT AXLE(4WD) -------------------------------------- 6-1

SECTION 1.GENERAL DESCRIPTION -------------------------------- 6-1

SECTION 2. SPECIFICATIONS -- 6-2

SECTION 3.DISASSEMBLY,INSPECTION,AND REASSEMBLY 6-3

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Chapter 6 Front axle(4WD)

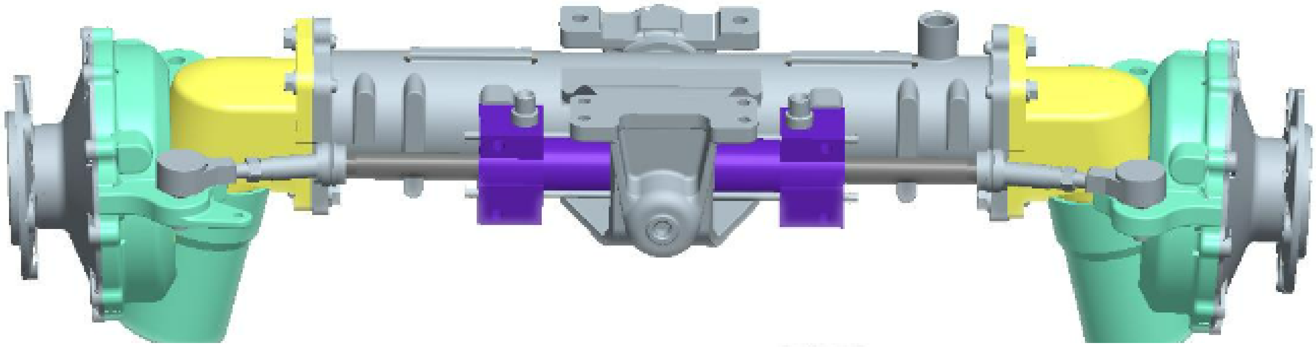
1. GENERAL DESCRIPTION

The 4WD front axle is a center pivot type. The front wheel drive mechanism is incorporated as a part of the axle.

The front wheel drive power is taken off the rear transmission and transmitted to the differential in the front axle where the power is divided into right and left and to the respective final cases.

In the final cases, the transmitted revolution is reduced by the bevel gears to drive the front wheel.

The 4WD mechanism with bevel gears provides wider steering angle and greater durability.



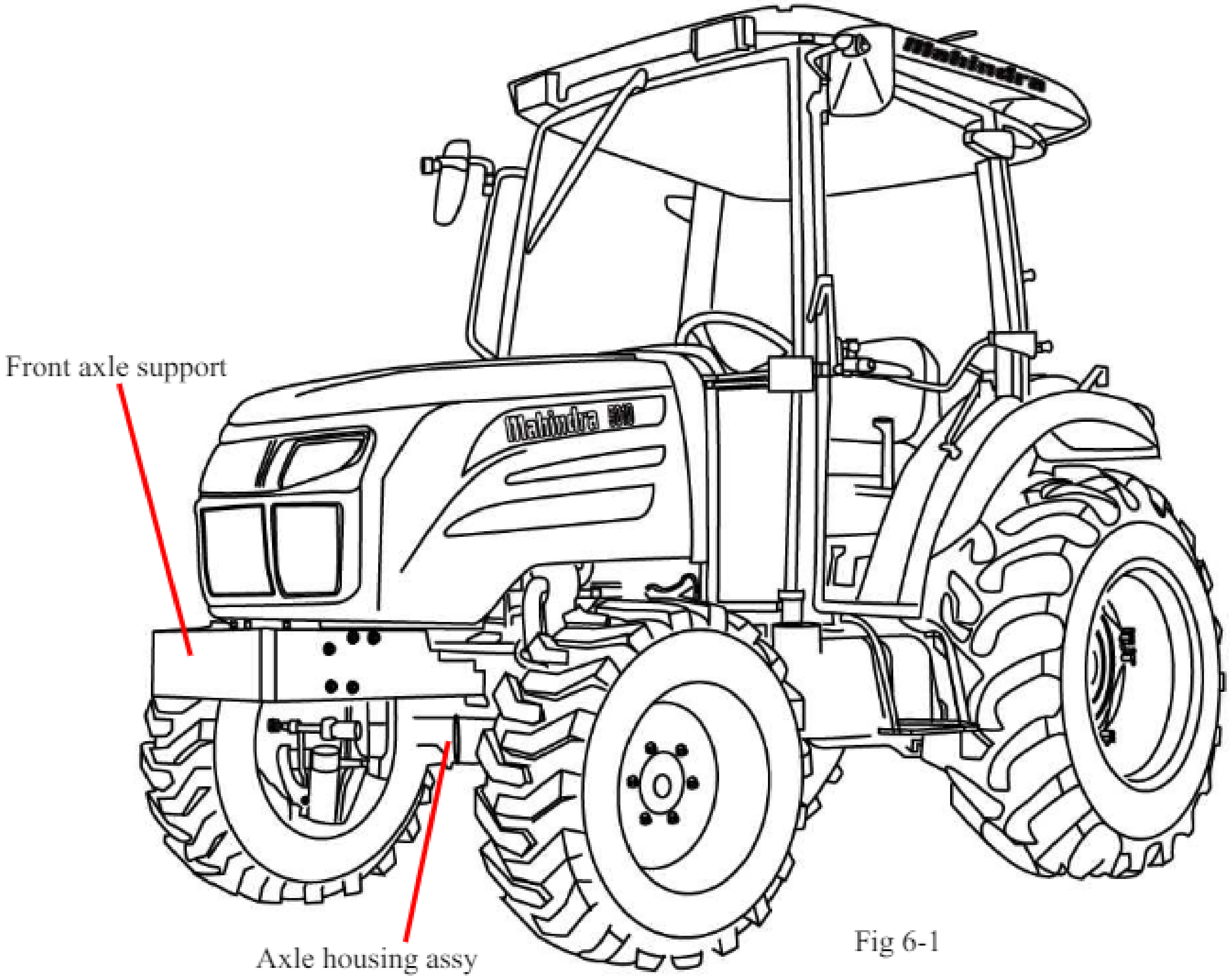


Fig 6-1

		2655
Wheel alignment	Toe-in (mm)	2 ~ 6 mm
	Camber	3°
	Caster	1°
Front axle	Pivot metal (F) bore (mm)	Φ55
	Pivot metal (R) bore (mm)	Φ80
	Pivot metal (F) bush (mm)	50X55X20
	Pivot metal (R) bush (mm)	75X80X30
	Housing (F) Diameter (mm)	Φ50
	Housing (R) Diameter (mm)	Φ75
	Front wheel steering angles (RH)	52 °
	Front wheel steering angles (LH)	52°
	Swing angles (LH, RH)	7°

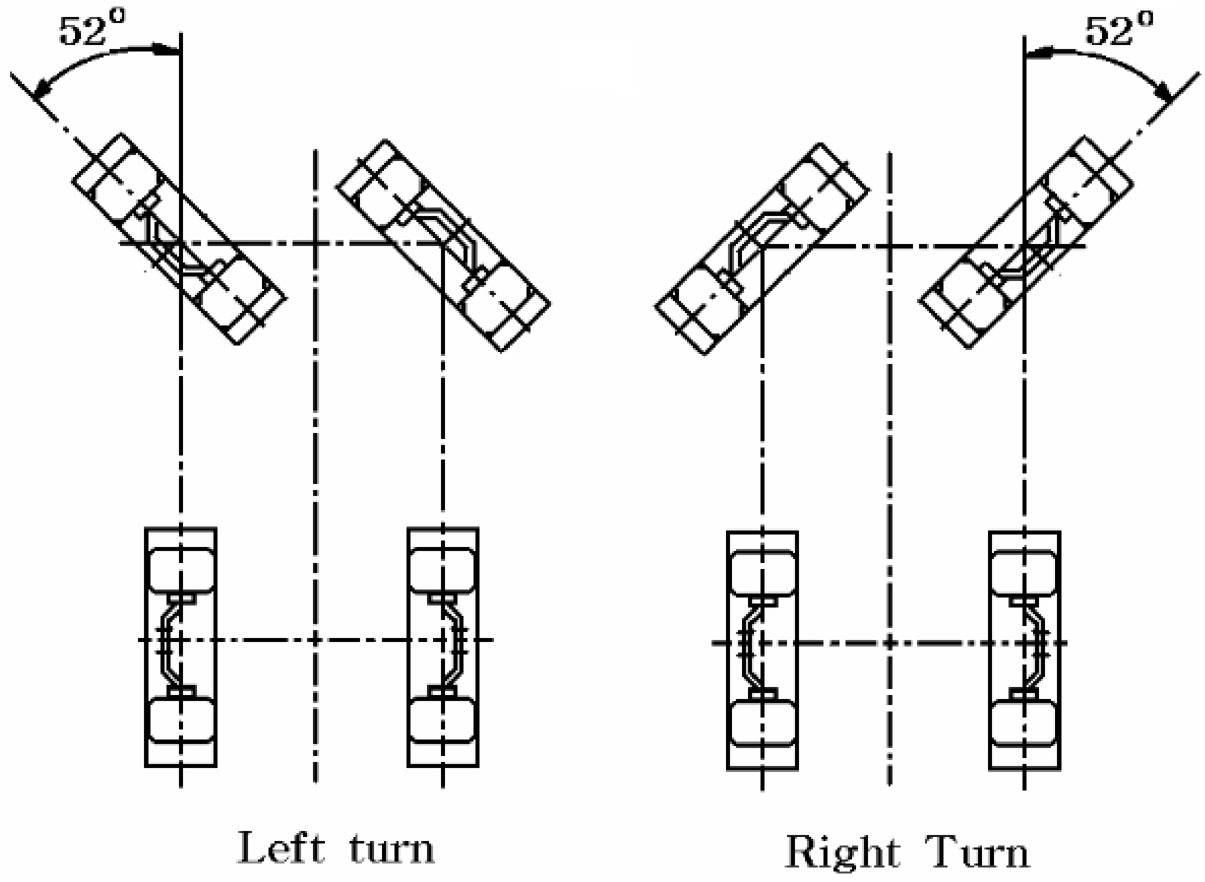


Fig.6-2

SECTION 3. DISASSEMBLY,INSPECTION,AND REASSEMBLY

1. CENTER PIVOT

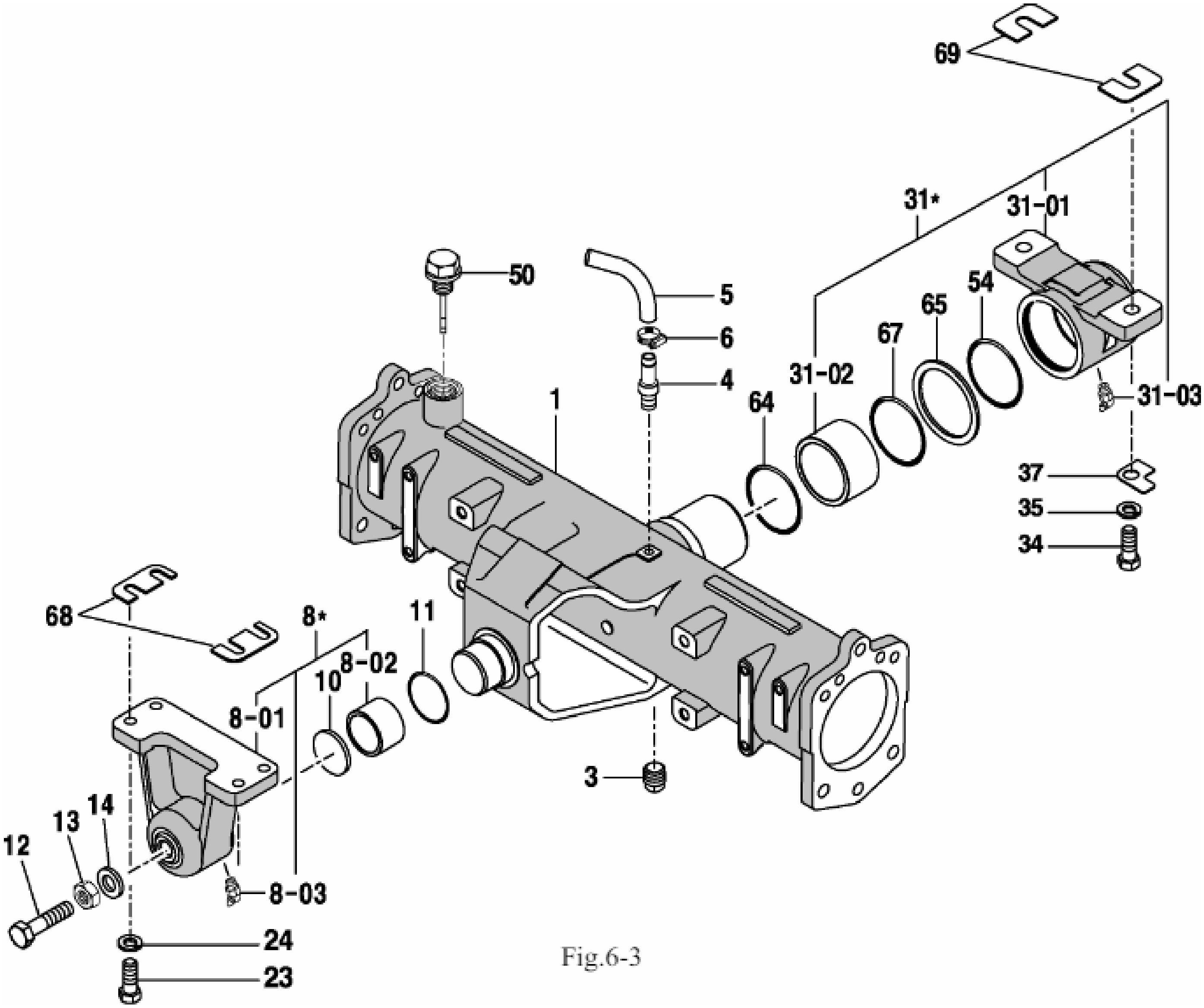


Fig.6-3

1.Housing,front axle
3.Plug,square
4. Connector
5. hose assy 530
6. clamp worm 14.5
8.Metal pivot
10.Spacer(F)
11.O-ring
12. Bolt, Hex
13.Nut,hex
14.Washer seal
23.Bolt,hex
24.Washer spring
31.Metal Pivot
34.Bolt,Hex
35.Washer spring
37.Washer
50.Cap,Oil
54.O-ring
64.O-ring
65.Spacer,R
68.Shim Set A
69.Shim set B

1.1.DISASSEMBLY

1) Dismount the front wheel drive shaft, referring to the pertinent paragraph in chapter 2.
2) Remove the right and left Hydraulic hose.
3) Suspend the front axle support with a chain.
4) Remove the front metal and rear metal clamping bolts. The front axle can then be separated from the axle bracket.
5) Remove the front and rear pivot metals.

1.2.INSPECTION

1) FRONT AXLE SHAFT DIAMETER

Measure the diameter at a roll bush contact point with a micro-meter or vernier calipers. If the measured value is less than usable limit, replace the housing front axle or bush in Metal pivot (F) or Metal pivot (R) .

	Front	rear
Standard value as assembled	Ø50	Ø75
Usable limit	Ø49.9	Ø74.9

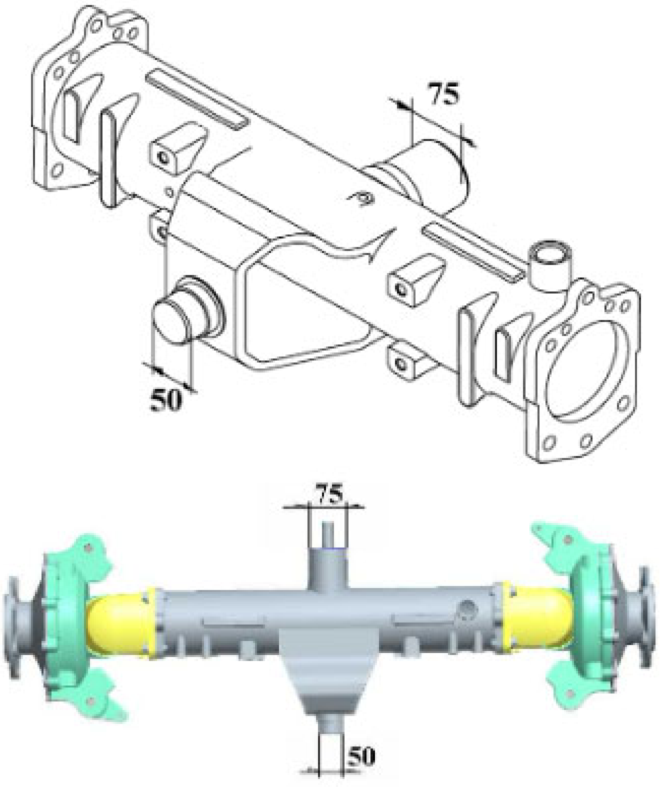


Fig.6-5

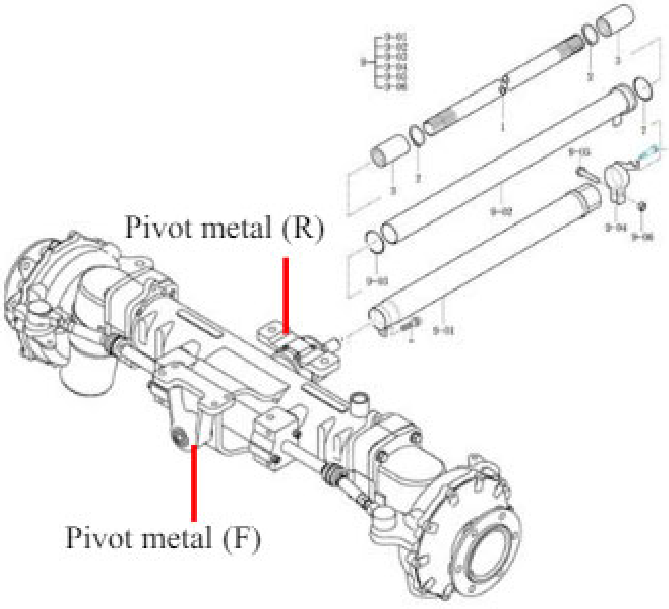


Fig.6-4

2) FRONT AXLE BUSH BORE DIAMETER

Measure the bore diameter of the roll bush in the pivot metal (F). If the measured value exceeds the usable limit, replace the bush.

	Front	rear
Standard value as assembled	Ø50	Ø75
Usable limit	Ø50.35	Ø75.35

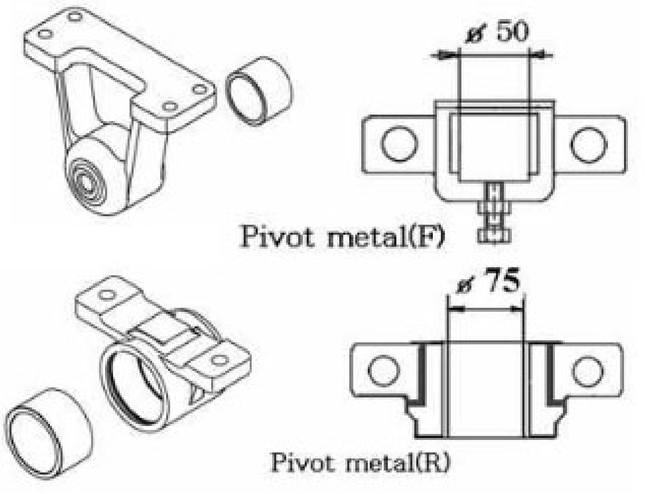


Fig.6-6

1.3 REASSEMBLY

Reassemble the parts in reverse order of disassembly, following these instructions.

1) Lips of the oil seals, bush contact surfaces, and O-rings should be coated with grease in advance.
2) When installing the roll bushes, abide by the following precautions.

-Use an installer and press in the bush on a press.
-The bore surface should be coated with grease in advance.
-The shim of the roll bush should reach position as shown Fig.6-7. In other words the seam should be in a position which is free from any load.

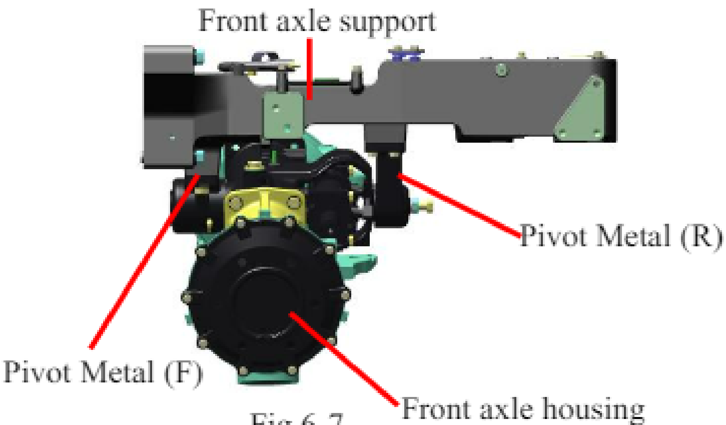


Fig.6-7

Note:
Slanted or forced installation of the bush should be avoided, and the bore surface of the bush should not be damaged.

3) Pay particular attention to the installed direction of thrust collar,that is,with the sharply-edged face turned towards the bevel gear case.
4) When the thrust collar has been replaced or the fore-and aft play of the front axle exceeds the usable limit,correct play by screwing in the adjust bolt on the top of the pivot metal (F).

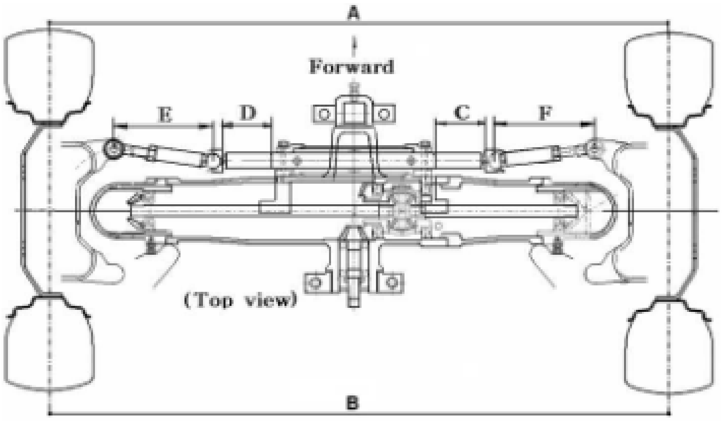
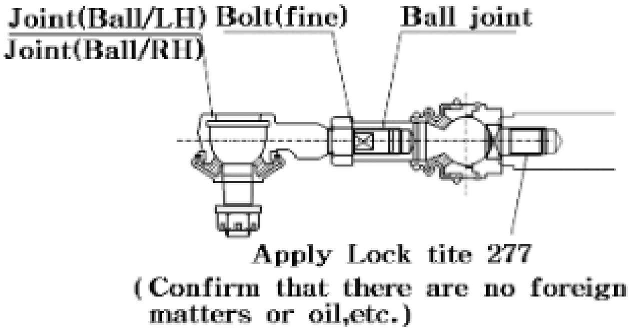


Fig.6-8

Note:
After correcting the pivot metal play, tighten the lock nut of the adjusting bolt to a torque of 11.7~13.7KN-m
(12~14 kg-m)

5) The reassembled front axle should rock smoothly while pivoting.
6) When the tie-rods are reinstalled,the toe-in should be adjusted.At the same time, the steering angles of the both wheels should also be adjusted.
7) Be sure the dimension C and D is same size and Adjust E and F as same dimension. (B-A=2~6)



Tightening torque(M20x1.5p)
: 24~26kg.m

Fig.6-9

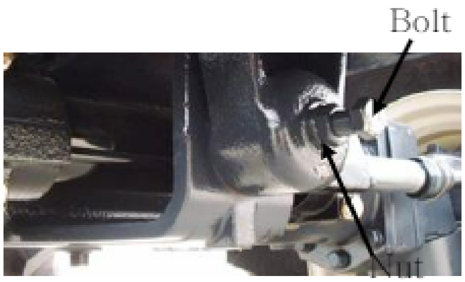


Fig.6-10

GAP ADJUSTMENT ON THE FRONT AXLE

Lift the front with a hydraulic jack to get the wheels of the ground. **Then loosen the nut and tighten the bolt fully and turn the bolt ½ to loosen again in order to roll the center pivot metal freely and tighten the nut again** While the wheels arte still off the ground, move the axle on the center pivot as a final check that the gap is set correctly on the top of the pivot metal

2. FRONT DIFFERENTIAL

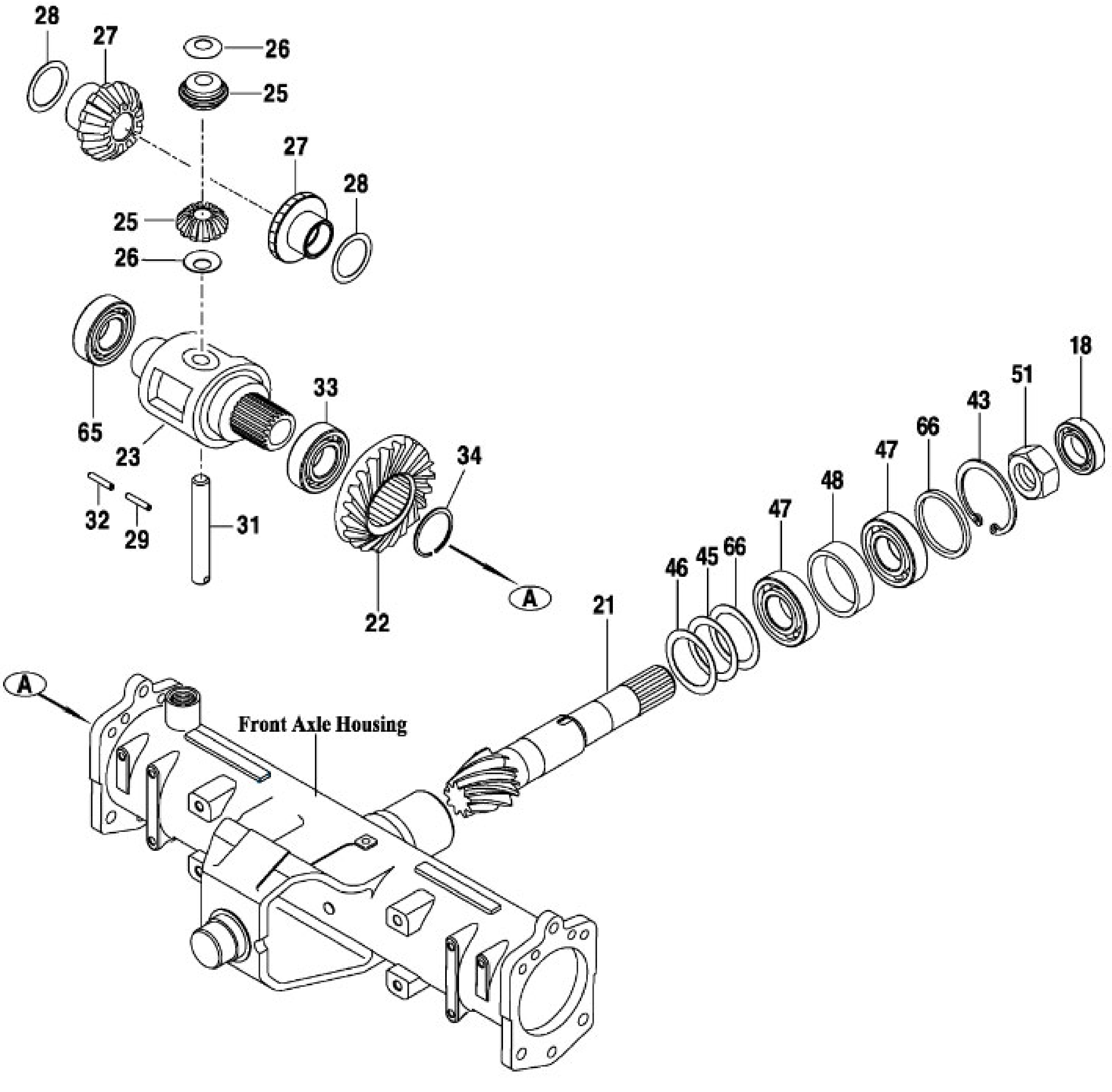


Fig.6-11

18.Seal,oil/D
20.Diff assy FF
21.Pinion Bevel 8T
22.Pinion Bevel 23T
23. Case FR Diff
25.Pinion,Diff(12)
26.Collar,thrust
27.Gear,Diff side(20)
28.Washer,thrust
29.Pin,Spring
31.Shaft,Diff Pinion
32.Pin spring
33.Bearing ball
34.Snap ring
43.C-ring
45.Shim A
46.Shim B
47.Bearing,Taper Roller
48.Collar
51.Nut,M30
65.Bearing ,Ball
66.Shim

2.1 DISASSEMBLY

1) As concerns operation prior to removal of the front axle, refer to the paragraph covering disassembly of the center pivot
2) Remove both wheels
3) Remove the drain plug from the final case and drain oil from the final case.
4) remove both final case assembly (A and B) from the front axle(Fig.6-11)

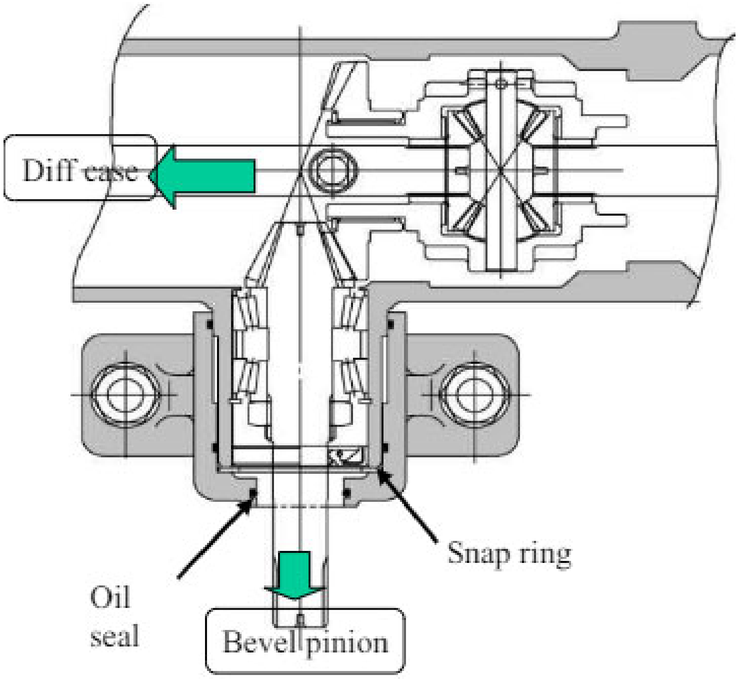


Fig.6-12

5) Remove the oil seal, assuring parallelism of the ring gear and bearing

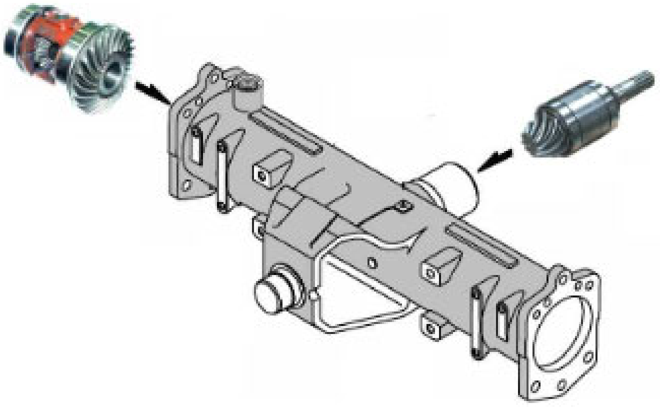


Fig.6-13

Note:
The number of shims(1) installed and the shimming thickness should be noted for later reference.

6) Remove the bearings from the Axle housing And the ring gear, and then the ring gear can be separated from the Axle housing.
7) Remove the straight pin which retains the axle housing.

Note: Discard the removed straight pin and oil seal and install a new pin and Oil seal when reassembled, because this pin and oil seal is apt to be damaged when removed.

8) Remove the snap ring and the bevel pinion can then be removed together with the TRB's (Fig.6-11)
9) When separating the TRB's from the bevel pinion, release the calking of the lock nut and remove the bearings.

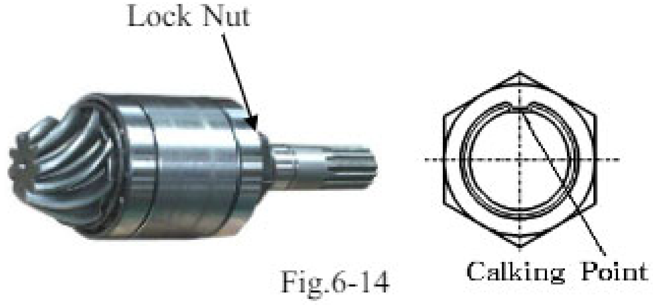


Fig.6-14

Note:
The lock nut should be calked at a point completely apart from the threads may damage the threads of the bevel pinion.

2.2 INSPECTION

1) visually check the bearing surfaces of the bevel pinion and ring gear teeth.

Note:
The bevel pinion and the ring gear should be replaced as a pair.

2) seriously worn or damaged parts should be replaced.

2-3.REASSEMBLY

Reassembly the parts in reverse order of disassembly, following these instructions.

1)Each friction surface should be coated with grease in advance.
2)The bevel pinion and the ring gear make a distinct pair after a mesh adjustment performed at the factory. Consequently, when reassembling the pair, be sure to pair parts with a same reference number.

-Tighten the lock nut to the specified starting torque of the single unit of the bevel pinion.

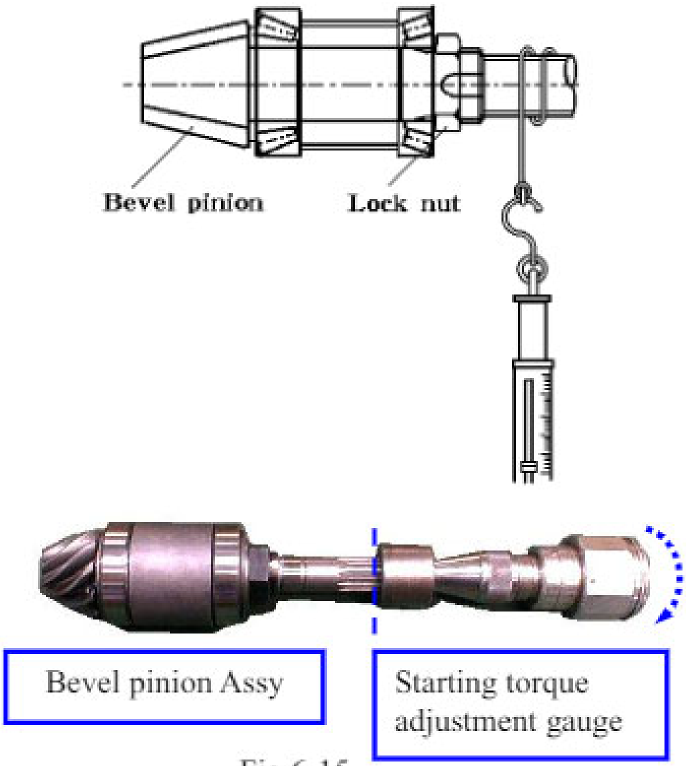


Fig.6-15

Note:
As a general rule, a disassembled lock nut should be replaced and a new one should be installed. However, when there is no alternative but to reuse the disassembled lock nut assure that it can lock securely.

Note:
Measure the starting torque a manner as shown in the figure 6-14.

Specified starting torque	11 -13 Kgf-cm

-When any of the bevel pinion, ring gear, TRB, collar, etc. has been replaced, inspect the bevel pinion assembly for thrust play in the front axle housing.

Specified thrust play mm (in)	0.13-0.2 (0.005-0.0078 in)

Note:

TRB and collar should be replaced as a pair.

(1) Bevel pinion (8)

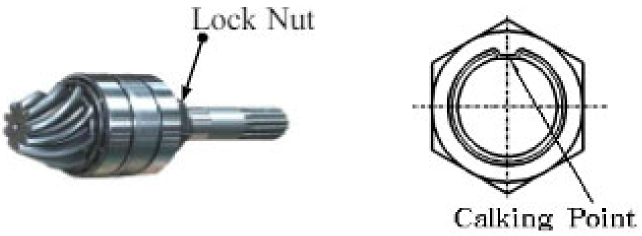


Fig.6-16

(2) FRONT DIFF CASE

a. When installing washer and thrust washer, apply fresh Molybdenum grease ahead of time.
b. Apply fresh Molybdenum grease to teeth of diff-pinion and diff-side gear.
c. Each parts should be washed clean, and There should be no sharp edge to the surface of thrust washer.
d. When assemble the spring pin, Be sure the spring pin should be different direction (Ø5 and Ø3)
e. When any of the bevel pinion, ring gear, TRB, collar, etc. has been replaced, inspect the bevel pinion assembly for thrust play in the front axle housing.

Specified thrust play mm(in)	0.13-0.2 (0.005-0.0078 in)

3) DIF CASE AND BEVEL PINION

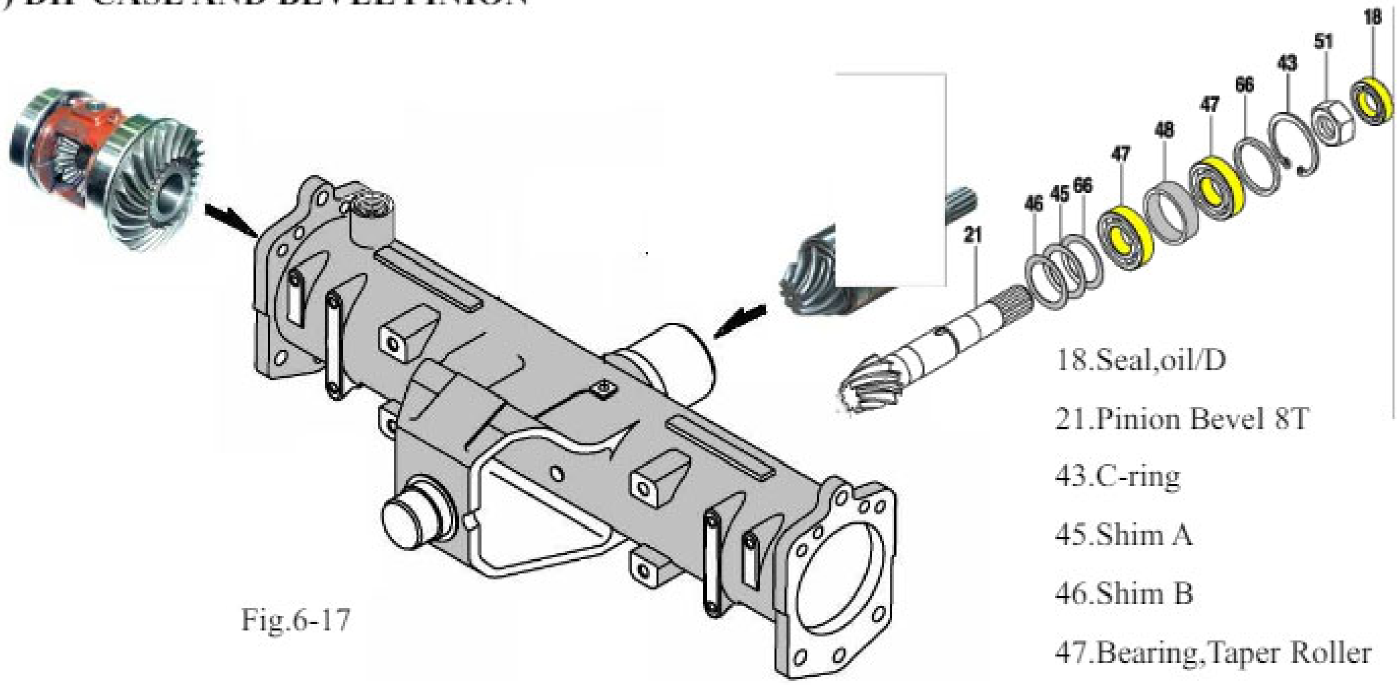


Fig.6-17

18.Seal,oil/D
21.Pinion Bevel 8T
43.C-ring
45.Shim A
46.Shim B
47.Bearing,Taper Roller
48.Collar
51.Nut,M30
66.Shim

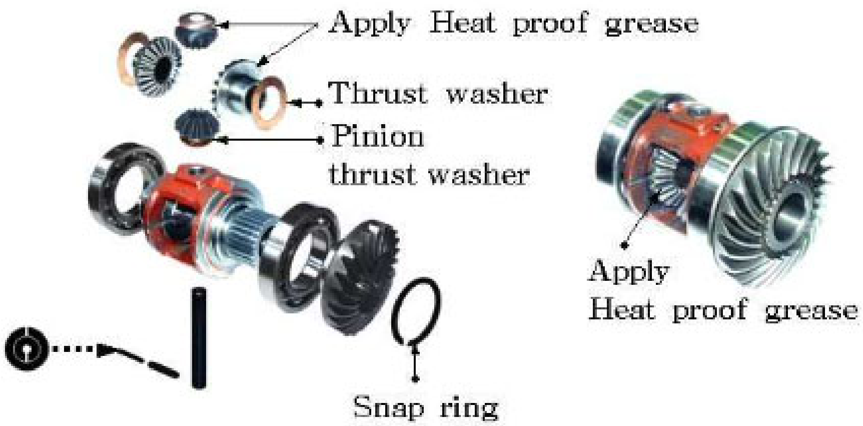


Fig.6-18

1) Each friction surface should be coated with grease in advance.
2) The bevel pinion and the ring gear make a distinct pair after a mesh adjustment performed at the factory. Consequently, when reassembling the pair, be sure to pair parts with a same reference number.
3) When installing the TRB's from the bevel pinion, be sure the calking of the lock nut and the bearings.
4) Install the snap ring and the bevel pinion can then be installed together with the TRB's (Fig.6-17)

Note: Discard the removed straight pin and oil seal and install a new pin and Oil seal when reassembled, because this pin and oil seal is apt to be damaged when removed.

5) Install the bearings from the Axle housing And the ring gear, and then the ring gear can be assembled from the Axle housing.
6) Install the straight pin(4) which retains the axle housing.
7) When any of the bevel pinion, ring gear, TRB, collar, etc. has been replaced, inspect the bevel pinion assembly for thrust play in the front axle housing through drain plug hole.

Specified thrust play mm (in)	0.13-0.2 (0.005-0.008 in)

3. FINAL CASE

3-1. Front gear case 1,2

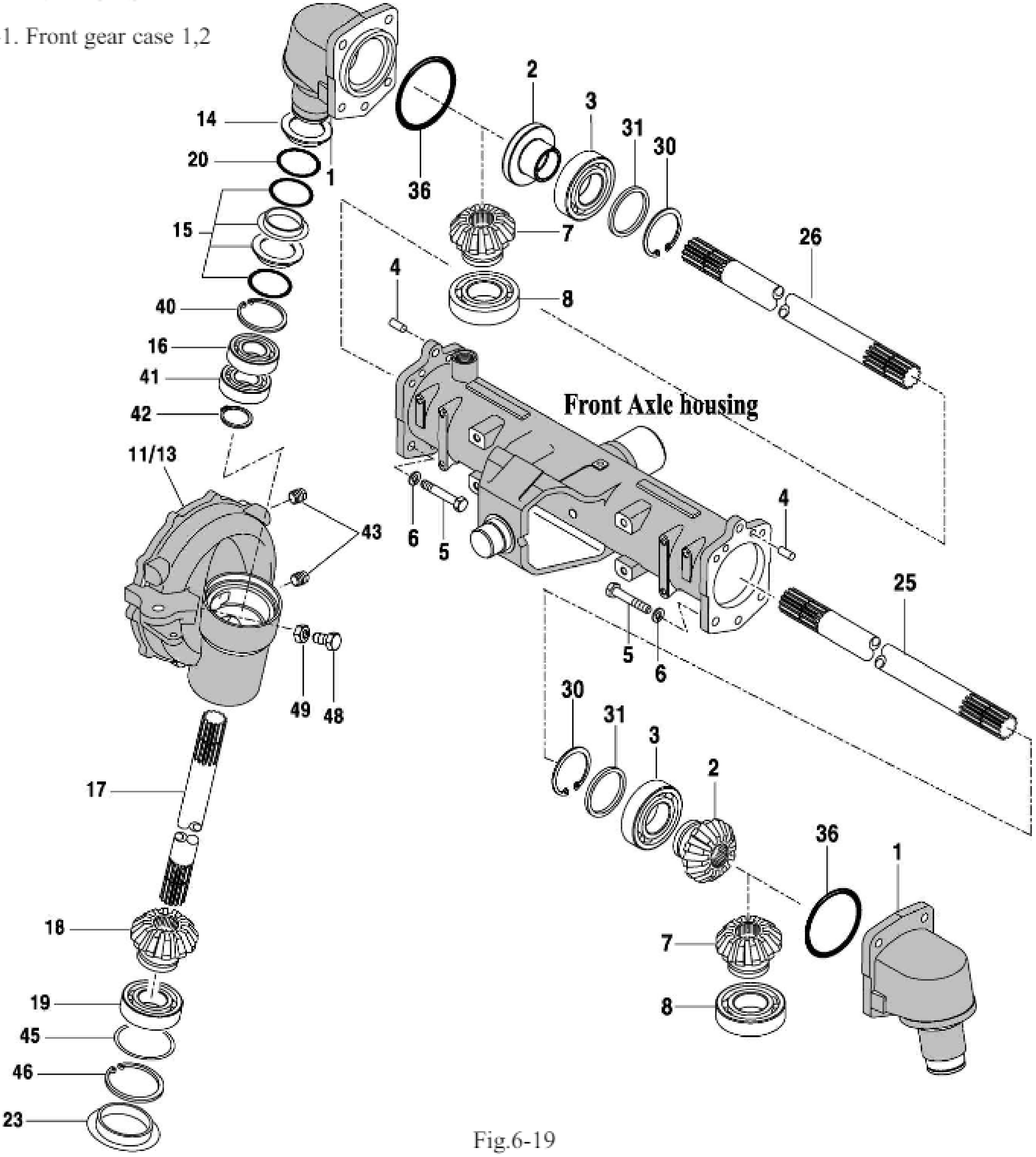
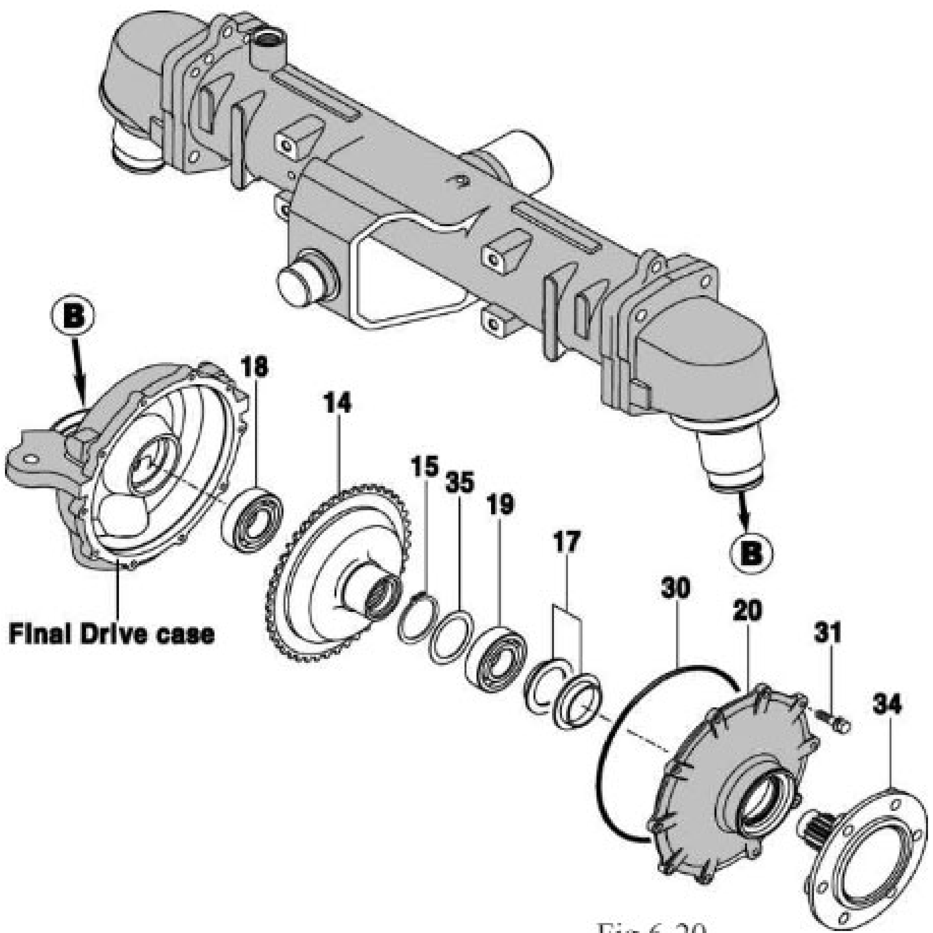


Fig.6-19

1.Case,Final Drive (A)
2.Gear Bevel 9
3. Bearing Ball/HL1
4. Pin Parallel
5.Bolt
6.Washer spring
7.Gear,Bevel 16
8.Bearing,ball
11.Case,LH Final Drive
13. Case, RH Final Drive
15. Seal
16.Bearing Ball
17.Shaft
18. Gear, Bevel 11T
19.Bearing,Ball
20.O-ring
23. Cap 90
25.Shaft,528
26.Shaft ,344
30.C-ring
31.Collar,68X80X2
36.O-ring
40.C-ring
41.Bearing,Ball
42.C-ring
43.Plug,square
45.Shim 75X90X2
46.C-ring
49.Nut

3-2. Front gear case 3.



14. Gear Bevel 38T
15.C-ring
17.Seal
18.Bearing Ball/HL1
19.Bearing,Ball
20.Cover,wheel shaft
30.O-ring
31.Bolt,Hex
34.Shaft,wheel
35.Washer,50X60X2

Fig.6-20

3.1 Disassembly

1) Drain oil from the final case by removing the drain plug.
2) Remove the tie rod or the tie rod end.
3) Remove the final drive case clamping bolts and take out the assembly of the wheel shaft,
4) Remove the wheel shaft cover clamping bolts and cap (100)

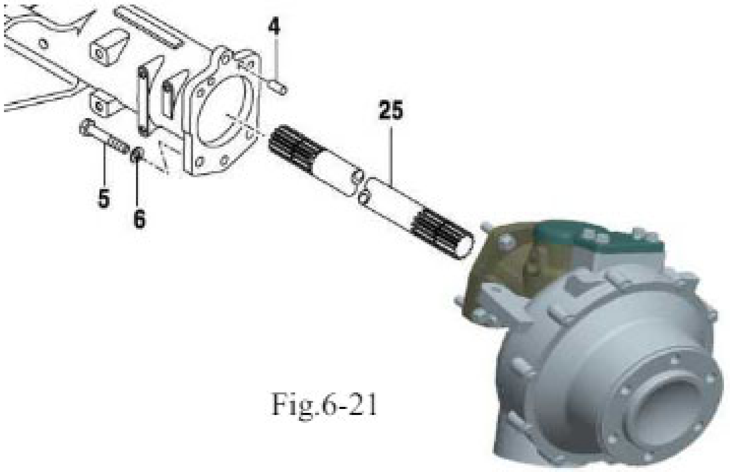


Fig.6-21

Note:
Discard the removed Cap(100) and install a new cap(100) when reassembled, because this cap is apt to be damaged when removed.

5) Detach the snap ring C from the bevel gear.
6) Extract the wheel shaft bearing together with the bevel gear, using a bearing puller

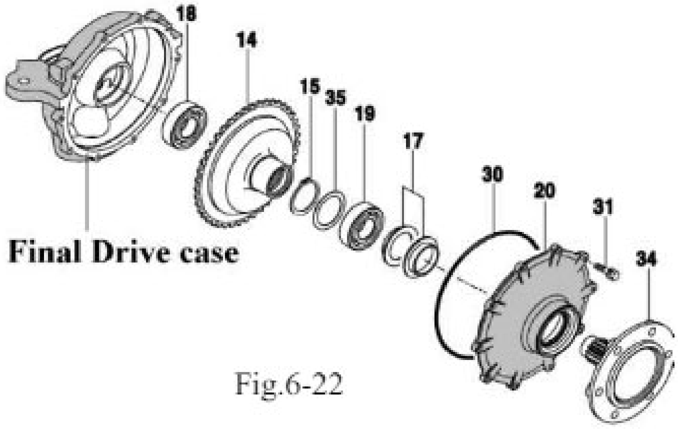


Fig.6-22

7) Remove the stop ring and the wheel shaft can be extracted.

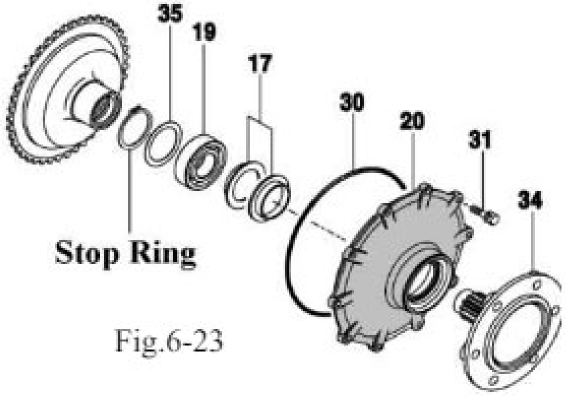


Fig.6-23

8) Remove the seal from the wheel shaft cover

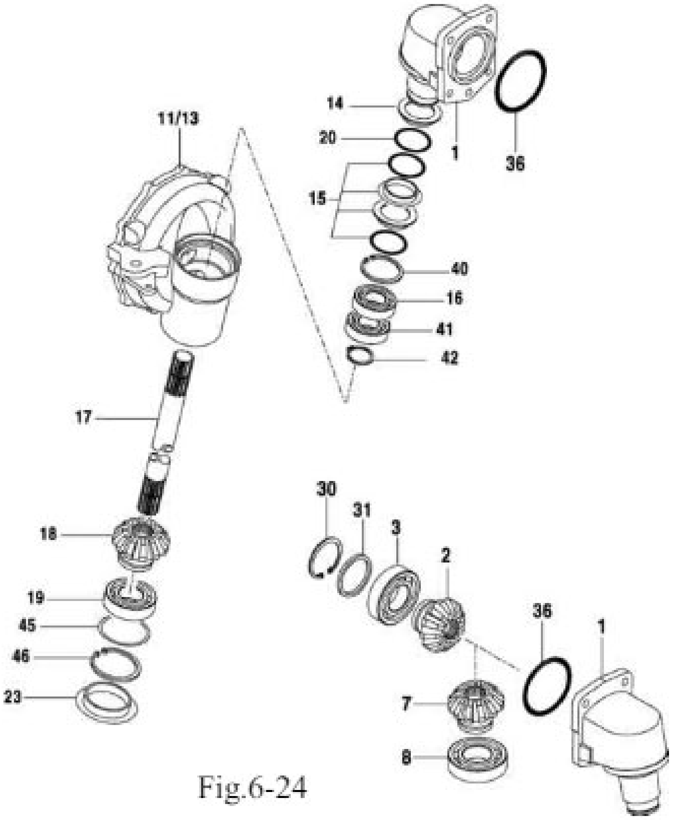


Fig.6-24

9) Remove the cap (23) from the bottom of the final case B and detach the snap ring(hole). Then the counter shaft(17) and RBB can be removed.

Note:
The removed cap(90) (black plug) should be discarded and replaced when reassembled.

3.2 INSPECTION

1) Wheel shaft cover

- Inspect mechanical oil seal, O-rings, Gears, cases, etc. and replace them if worn or damaged.
- Measure the diameter the part which makes contact with the wheel shaft, with a micro-meter or vernier-calipers. When the measured value less than the usable limit, replace the wheel shaft cover.

Standard value	62
Usable limit	61.9

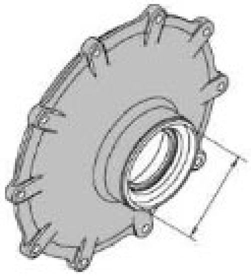


Fig.6-25

2) Final Drive case (B)

- Measure the diameter the part which makes contact with the Final drive case (A), with a micro-meter or vernier-calipers. When the measured value less than the usable limit, replace the wheel shaft cover.

Standard value	110
Usable limit	110.1

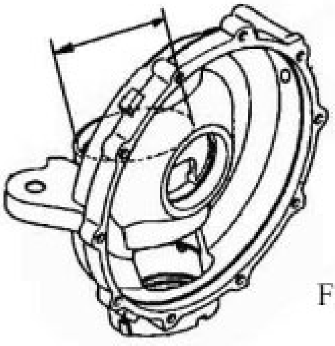


Fig.6-26

3.3 REASSEMBLY

Reassemble the parts in reverse order of disassembly, following these instructions.

1) Apply an adhesive (THREE BOND TB1215) to the following parts.
   a. Contact surfaces between the final case B and wheel shaft cover.
   b. Contact surfaces between the final case A and front axle.
2) The installed wheel shaft should turn smoothly.
3) When installing unitized seals on the wheel shaft cover and the rotating part between the final cases (A and B), apply force only to the outer circumference of the seal as shown in Fig.6-26 to avoid deformation.

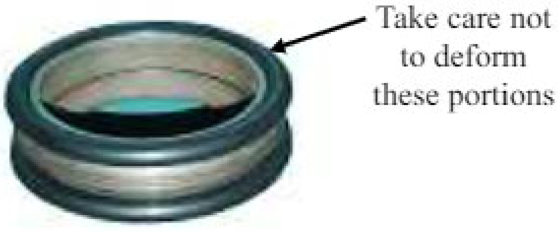

Take care not to deform these portions

Fig.6-27

4) The oil seal should be coated with grease in advance. Then install them carefully, assuring that their lips are not turned over.
5) The reassembled final case (B) should turn smoothly until it makes contact the stopper.

6) When the wheel (tire) is reinstalled, turn it by hand to make sure that all the mechanism turns smoothly without making any noise.
7) After adjustment of the toe-in, perform road tests. There should be no abnormalities such as vibration, abnormal noises, defected steering wheel operation, etc.

-Wheel shaft cover

1) Every snap ring(6) should be seated securely in its groove.
2) Be sure the numbers of Bevel gear is correct

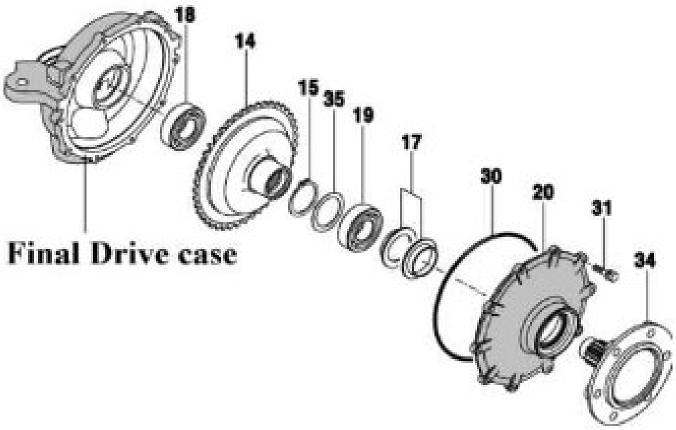


Fig.6-28

-Final drive case A

1) Each parts should be washed clean before reassembly.
2) Apply multi-purpose, quality grease to bearings in advance
3) Every time a gear and bearings are installed, its smooth rotation should be checked
4) Adjust Back lash between bevel gear (38T) and bevel gear (11T) with collar(35) .

Back lash mm (in)	0.1-0.2 (0.003-0.008 in)

5) Apply oil to the housing ahead of time to install the mechanical seal.
6) Be sure that the length of shaft.
7) Tighten the bolts to the specified torque.

Tightening torque	550-700Kgf.cm

8) Adjust backlash between gear bevel and gear bevel (2) with collar

Back lash mm (in)	0.1-0.2 (0.003-0.008 in)

9) Apply an adhesive to the Cap (90),and be sure not to deform when installing.

Note: Refer to Fig.6-23

- FINAL DRIVE CASE AND HOUSING

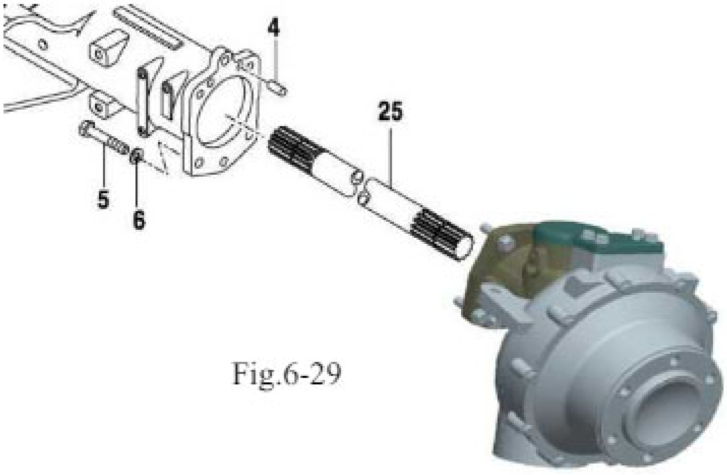


Fig.6-29

1) When installing the shaft, Be sure that the gears are not damaged.

2) Be sure the differences between the LH and RH shaft.

	LH	RH
Specified length	528mm	344mm

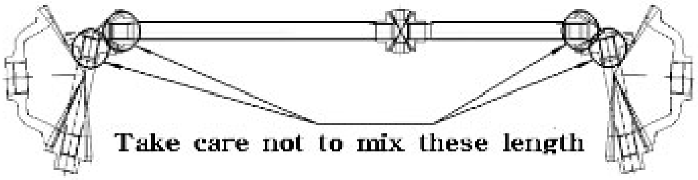


Fig.6-30

3) Tighten the bolts to specified torque.

Tightening torque	1300-1500 Kgf.cm

- STEERING CYLINDER

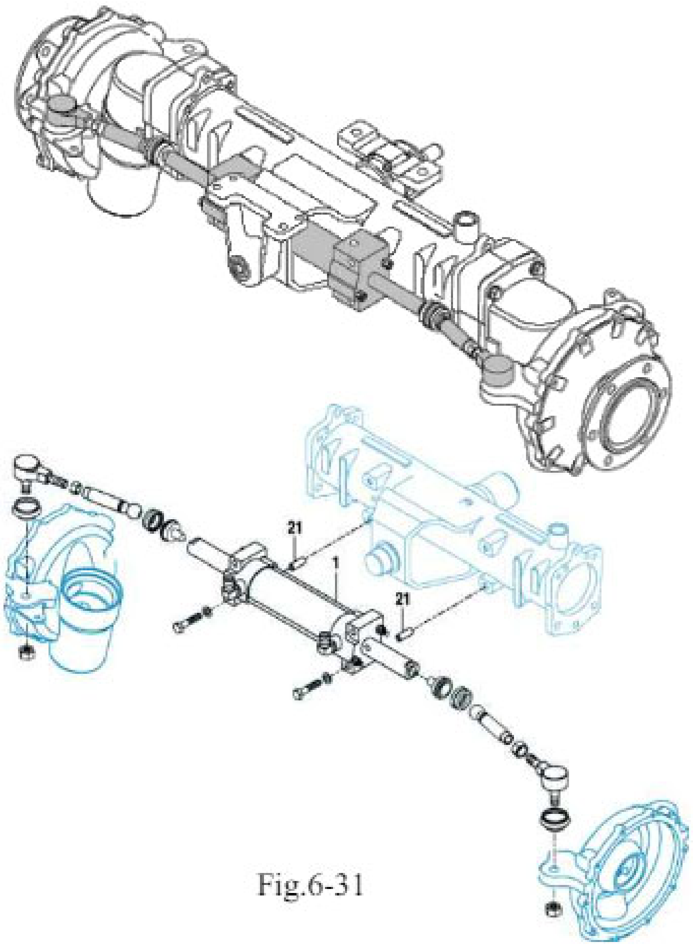


Fig.6-31

1) When installing the steering cylinder, be sure that the rods are not damaged.
2) Install the pin(21) before assembling the cylinder.
3) Apply an adhesive Locktite and tighten the bolts to specified torque

Tightening torque	900-1100 Kgf.cm

4) Apply an adhesive locktite to the ball joint (7) and tighten the ball joint to specified torque

Tightening torque	2400-2600 Kgf.cm

5) Be sure to bend the split pin (5) after installing the ball joint

PROBLEMS AND PROBABLE CAUSES	COUNTERMEASURES
● Steering wheel hard to turn	
1)Too low tire inflation 2)Broken thrust bearing 3)Stuck or broken ball joint of tire-rod end 4)Seizure or poor lubrication of axle end bush	Inflate to specified value Replace Grease or replace Grease or replace
● Vibrating or pulling steering wheel	
1)Unbalanced wheels 2)Wheel deflation 3)Unequal diameter of both tires 4)Loose,worn,or damaged wheel axle bearing 5)Loose,worn,or damaged wheel steering wheel shaft 6)Worn final case bush 7)Loose final case-front axle tightening bolt 8)Loose front wheel (tire) tightening nuts	Adjust balance Repair or replace Adjust inflation or replace Repair or replace Retighten or replace Replace Retighten Retighten
● Steering wheel tends to turn to the right or left while traveling on straight paved road.	
1) Deflected wear of tire 2) Different tire diameters 3) Damaged final case bearing	Replace Adjust inflation or replace Replace
● Excessive or eccentric wear of tire	
1)Improper tire inflation 2)Worn front wheel shaft bearing 3)Poorly adjusted toe-in 4)Front wheel drive is always engaged	Adjust Replace Readjust correctly:0~5mm (0.08-0.24 in) Engage FWD only when required
● Noise	
1)Loose fasteners 2)Worn or damaged final case bearing 3)Worn bush 4)Wear or poor movement of tie-rod end 5)Excessive backlash of differential and bevel gear	Tighten correctly to specified torque Replace Replace Lubricate or replace Adjust
● Different steering angles in both directions	
1)Lengths of RH and LH tie-rods are different	Adjust

CHAPTER 7
Rear axle and brakes

SECTION 1.GENERAL DESCRIPTION---------------------------------- 7-1

SECTION 2. SPECIFICATIONS--- 7-2

SECTION 3.DISASSEMBLY,INSPECTION,AND REASSEMBLY-- 7-3
1.Rear axle housing and brake system------------------------------------ 7-3
1.1. Disassembly -- 7-4
1.2. Inspection -- 7-4
1.3. Reassembly -- 7-5
SECTION 4.TROUBLE SHOOTING ------------------------------------- 7-7

Chapter 7. Rear axle and brakes

1. GENERAL DESCRIPTION

The rear axle system is of the central axle type, which contains the final reduction gears, differential gears with diff-lock, and brakes. The power from the engine is transmitted to the right and left wheel pinions through the differential gears, and reduced in the revolution to the rear wheels by the wheel gears. A wet, multi-Disc, mechanical operated brake system is employed. Each of the brakes has 5 friction plates and can produce significant braking force with excellent durability. The two actuators work to push their friction plates in opposite directions, that is, outward, so that stable braking force can be realized in both forward and reverse movements of the tractor. A dif-lock mechanism which is housed in the right-hand rear axle housing is employed to lock the differential gears and is activated by depressing the diff-lock pedal, resulting in the same rotary speeds of both wheels.

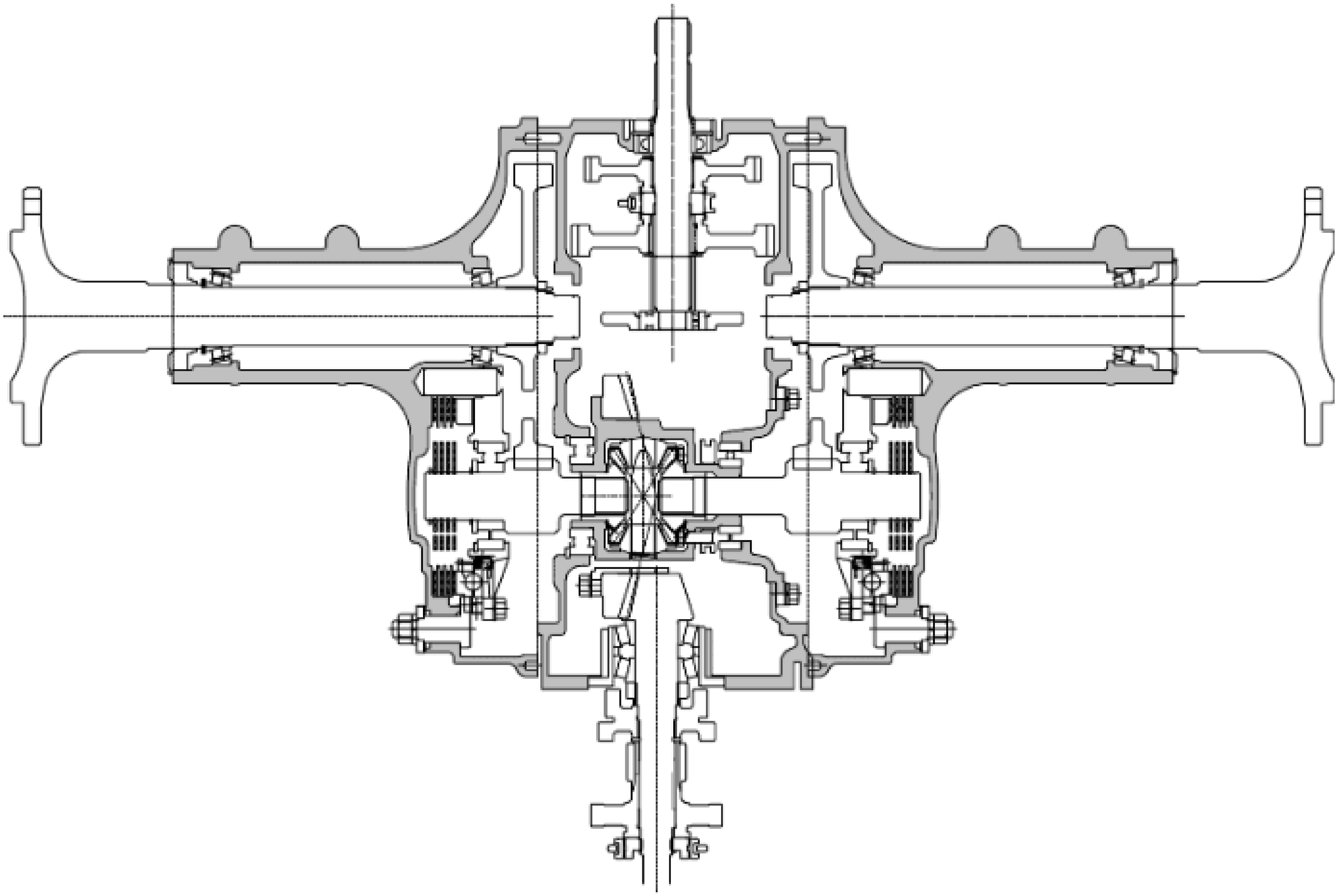


Fig.7-1

SECTION 2. SPECIFICATIONS

MODEL			2655 HST
Final reduction gears		Type	Helical gears
		Reduction ratio	4.9
Brake system	Friction Plate	Type	Wet, multi-disc, Mechanically operated
		diameter	Φ140(Φ5.5in) x Φ180mm(Φ7.0 in)
		Thickness	3.4±0.1 mm(0.134 in)
		Lining material	Paper base
		Number of plates	5 on each side
	Separator Plate	Outer diameter	Φ188mm(Φ7.4 in)
		Thickness	2.5±0.09 mm(0.098 in)
		Number of plates	4 on each side
		Metal brake assembly Installed thickness	29 ±0.1 mm(1.142 in)
		Total brake thickness	54㎜(2.126in.)

SECTION 3.DISASSEMBLY,INSPECTION,AND REASSEMBLY

Separate the rear axle housing from the rear transmission referring to paragraph 6 of SECTION 3.

SEPARATION OF MAJOR BLOCKS in Chapter 2

1) REAR AXLE HOUSING AND BRAKE SYSTEM

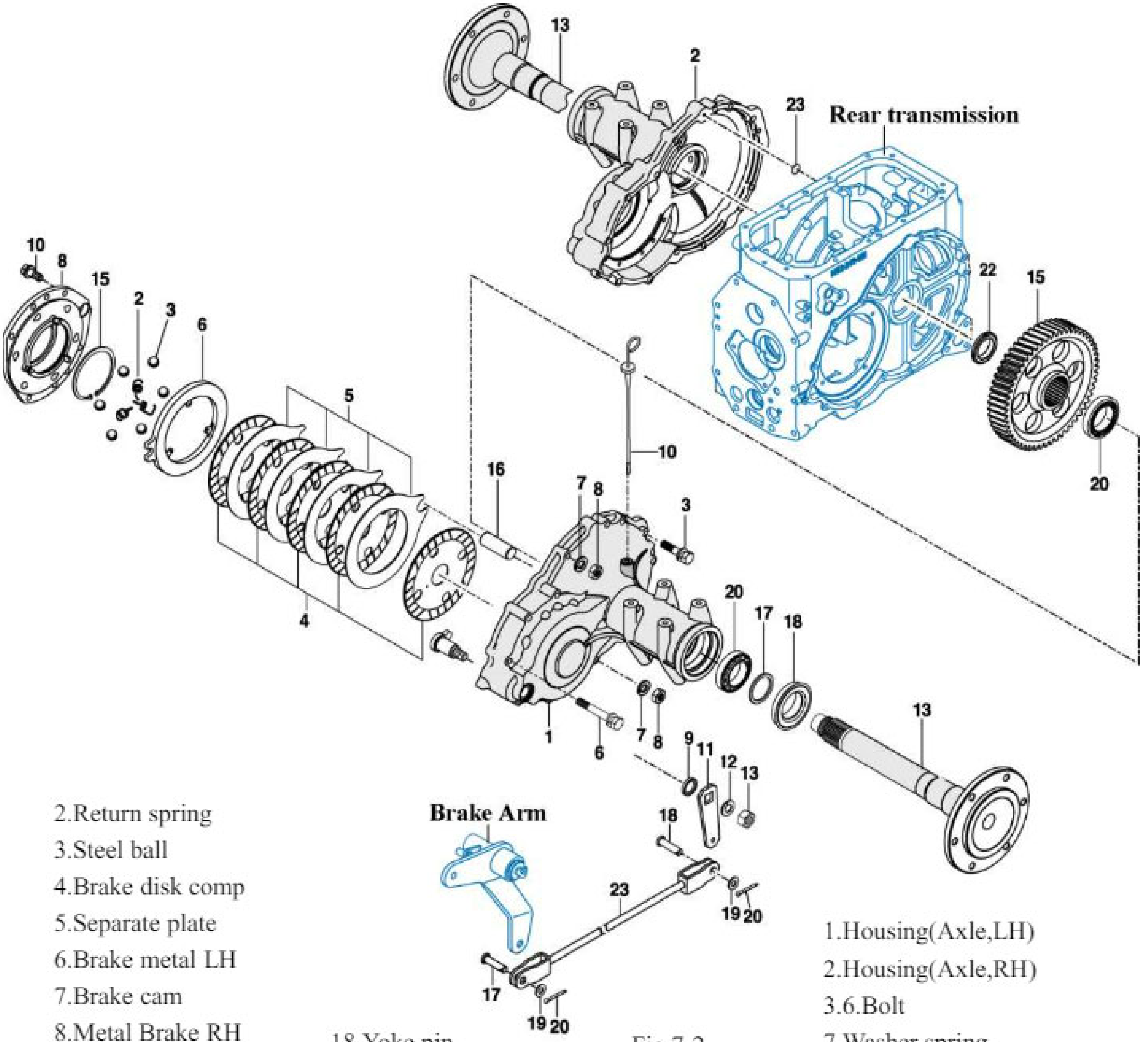


Fig.7-2

2.Return spring
3.Steel ball
4.Brake disk comp
5.Separate plate
6.Brake metal LH
7.Brake cam
8.Metal Brake RH
9.Oil seal
10.Bolt
11.Cam Brake
12.Spring washer
13.Nut
15.C-ring
16.Torque pin

18.Yoke pin
19.Washer
20.Split pin
23.Rod,Hook
26.Brake metal low RH
28.Brake metal upr RH
30.Brake ,LH
31.Brake,RH

1.Housing(Axle,LH)
2.Housing(Axle,RH)
3.6.Bolt
7.Washer spring
8.Nut
10.Oil gauge
13.Wheel shaft
15.Helical gear(54T)
17.Colar
18.Oil seal
20.Taper roller bearing
22. Nut
23.O-ring,P

1.1 Disassembly

1) Remove the brake cover tightening bolts and remove the disc brake assembly on it.
2)The actuator can be disassembled by removing Spring
3) Detach the brake arm and the cam from the brake cover (Fig.7-2)
4) Pull out the snap ring from the brake housing.
5) Remove the pinion gear.
6) Extract the bearing with a puller and Release the lock of Nut.
7) Remove the wheel gear
8) Remove the wheel shaft with a hammer
9) Be careful to keep the mechanical seal and the taper roller bearing

Note : Removed the Oil seal should be replaced with a new one when reassembled
Be careful to keep the friction surfaces of the linings, Actuators and separator plates free from damage and foreign matter.

1.2. INSPECTION

1) Friction plates.
Replace the plates whose surfaces have been become glossy by carbonization or whose thickness exceeds the usable limit.

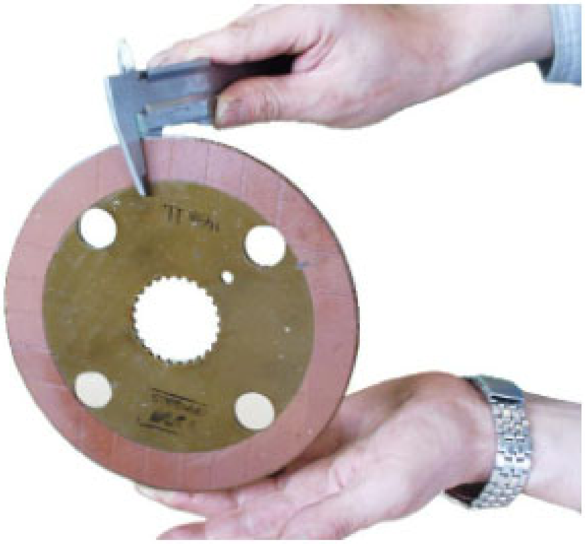


Fig.7-4

Standard thickness: mm (in)	3.4±0.1(0.134)
Usable limit : mm (in)	3.0 (0.118)

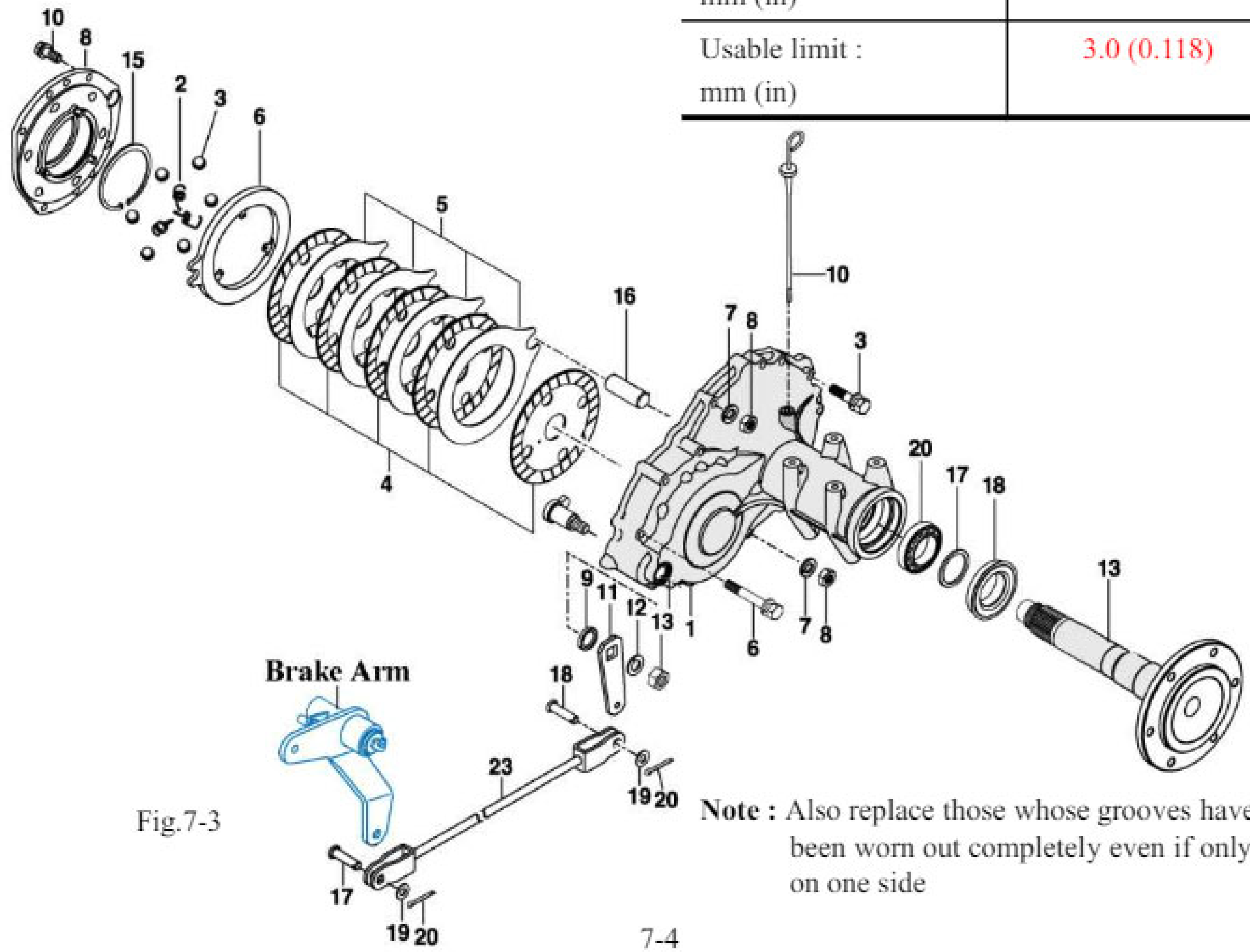


Fig.7-3

Note : Also replace those whose grooves have been worn out completely even if only on one side

2) Actuator (Reference)

Check the ball, spring, pressure plate, and brake rod for abnormality. Replace defective parts. Replace the actuator whose thickness exceeds the usable limit.

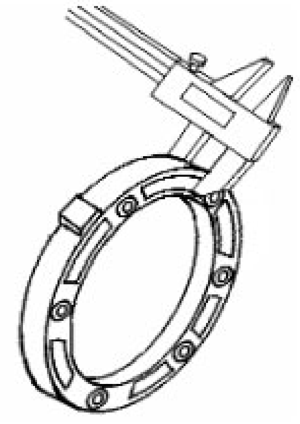


Fig.7-5

Standard thickness :mm	14.9±0.1
Usable limit: mm	14

Note:

Slight scratches on the friction surface can be corrected with sandpaper(#1000)

3) Separator plate.

Measure the thickness and replace the plate whose thickness exceeds the usable limit or whose surfaces are damaged (Fig.7-6)

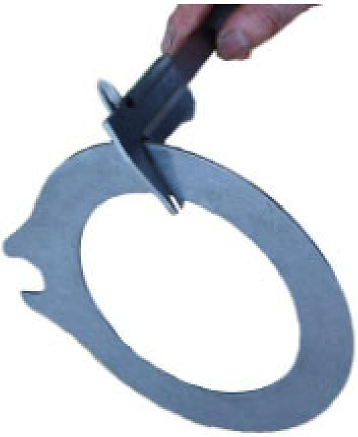


Fig.7-6

Standard thickness : mm (in)	2.5±0.09 (0.098)
Usable limit : mm (in)	2.2(0.087)

4) Wheel shaft

Check the shaft for abnormalities like wear, damage, etc, and replace a defective one.

5) Bearings

Check them for abnormalities like hitching, irregularity, etc. in rotation after being washed clean. Replace defective ones.

6) Oil seals

Removed oil seal should be replaced with a new one when reassembled.

1.3 REASSEMBLY.

Reassemble the parts in reverse order of disassembly, follow these precautions.

1) Make sure that oil grooves, friction surfaces, etc of the brakes are free from matter such as dust, iron powder, etc. to avoid brake lining damage.
2) When installing the brake unit on the wheel pinion, friction plates and separator plates should be arranged in correct order and never forget to retain the unit with the snap ring.
3) Metal Brake cover tightening bolts should be tightened to the specified torque with a torque wrench. (Fig.7-7)

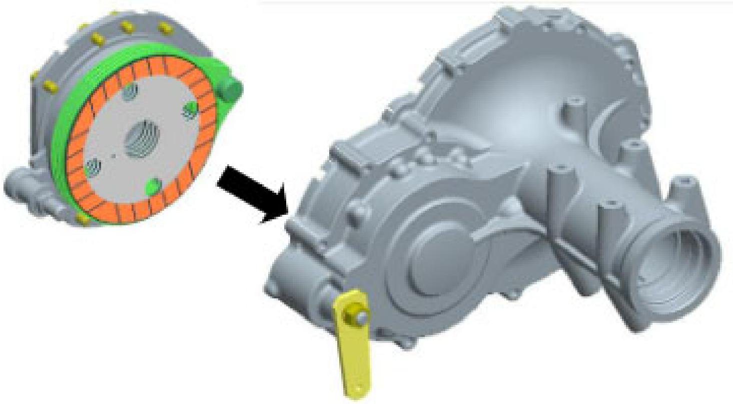


Fig.7-7

Tightening torque	5.5-7 Kgf.m (39.8-50.6ft-lbs)

4) Replace the mechanical seal.
Install the taper roller bearing into the axle housing, and the mechanical seal by the special tool as shown in the figure(Fig.7-8)

5) Install the wheel gear and bearing on the wheel shaft and retain them with nut.

6) Apply adhesive (THREE BOND 1215) to the contact surfaces of the brake cover and the housing and then retain the plates by tightening the nuts to the specified torque or the specified dimension.

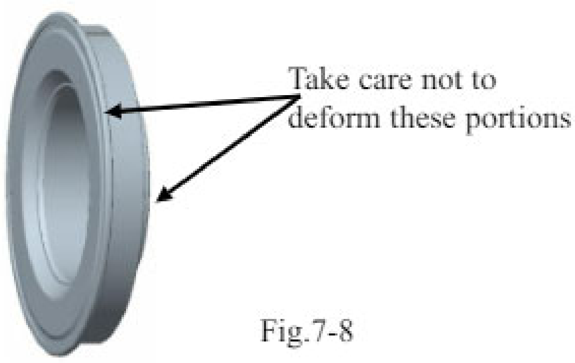


Fig.7-8

Tightening torque	0.6-0.8 Kgf.m (4.3-5.8ft-lbs)
Dimension	9.4±0.1

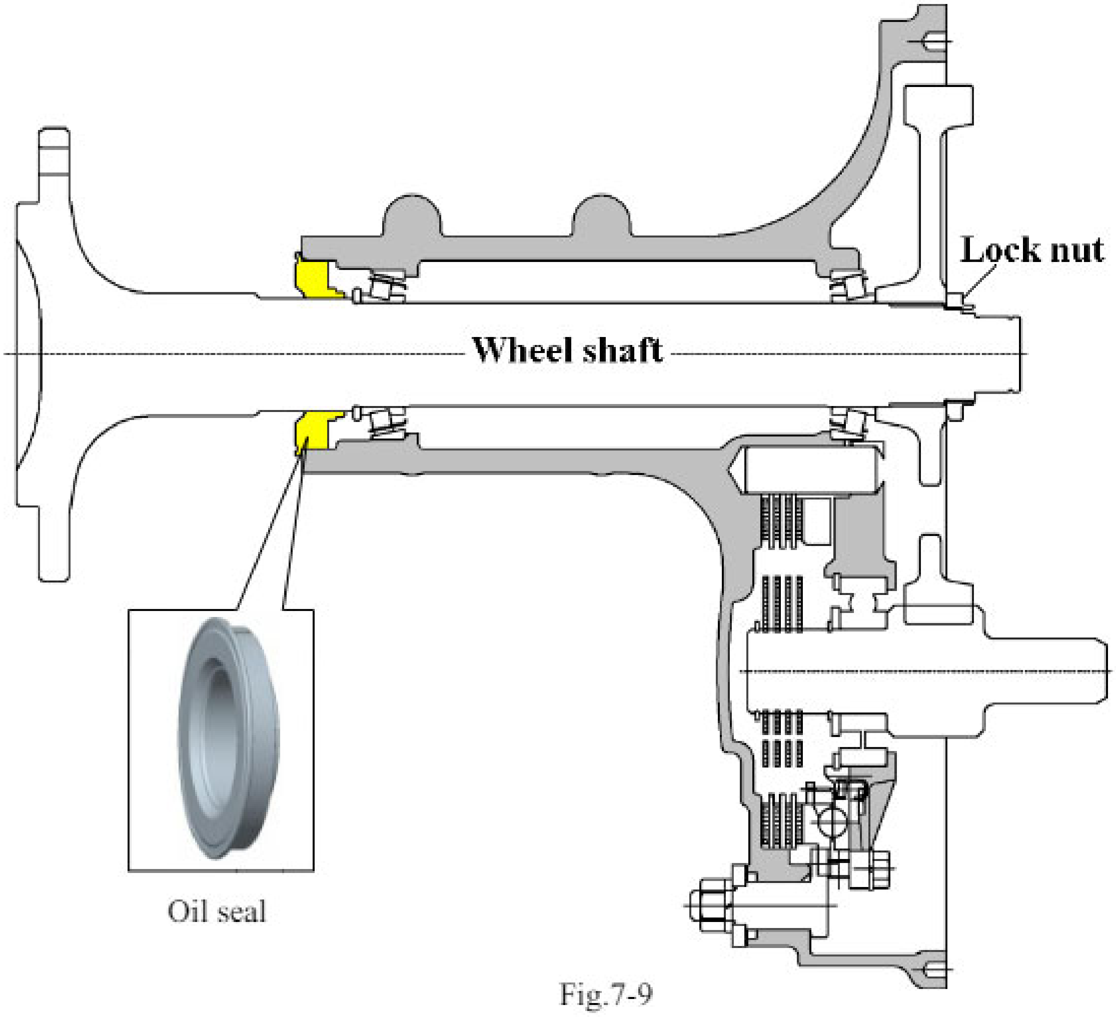


Fig.7-9

SECTION 4. TROUBLESHOOTING

Problem	Causes	countermeasures
1) Rear axle		
Noises	· Worn or damaged bearing · Worn gear or wheel shaft	Replace Replace
2) Brake system		
(1)Insufficient braking force	· Insufficient depressing of brake pedals · Improper pedal free play · Worn friction plates	Depress pedals positively Adjust Replace
(2)Brake noise	· Insufficient brake oil · Broken actuator spring · Eccentric wear of actuator	Replenish Replace Replace
(3)Brake overheating	· Insufficient oil · Excessive pedal free play · Improper operation	Replenish Adjust Operate brakes properly
(4)Brake cannot be disengaged completely.	· Improper brake pedal free play · Broken actuator spring · Broken pedal spring	Adjust Replace Replace
(5)Not uniform braking	· Improper free play adjustment · Worn actuator ball	Adjust Replace
(6)Excessive pedal play	· Improper adjustment of brake rod · Worn actuator-fork tightening bolt · Worn brake shaft or brake arm	Adjust Replace Replace

Chapter 8
Power assisted steering system

SECTION 1.GENERAL DESCRIPTION---------------------------------- 8-1

SECTION 2. SPECIFICATIONS-- 8-2
2.1 Gear pump --- 8-2
2.2 Steering valve --- 8-2
2.3 Oil tank --- 8-2

SECTION 3. FUNCTION--- 8-3
3.1 Open center non load reaction--- 8-3

SECTION 4.DISASSEMBLY,INSPECTION,AND REASSEMBLY

4.1 major component of steering valve assembly ------------------------ 8-5
4.2 Special tools -- 8-6
4.3 Disassembly -- 8-6

SECTION 5. TROUBLESHOOTING------------------------------------- 8-11

Chapter 8. Power assisted steering system.

SECTION 1. GENERAL DESCRIPTION

The hydraulics of this power-assisted steering system are actuated by a specially designed steering valve system.
Non Load reaction valve blocks the L,R cylinder ports in neutral condition and does not transmits the reaction load of the tire to the steering wheel in neutral. Generally the system is used for the vehicles that treat heavy equipment or low speed traveling.
Hydraulic circuit consists of Independent system.
The oil from tank flows into gear pump of orbitrol via filter, and the quantity of oil in the proportion to the rotations of steering wheel flows into steering Cylinder Via "R"-port at right turn and via "L"-port at left turn. As following figure shows components composition of power steering system on the vehicle with the Orbitrol

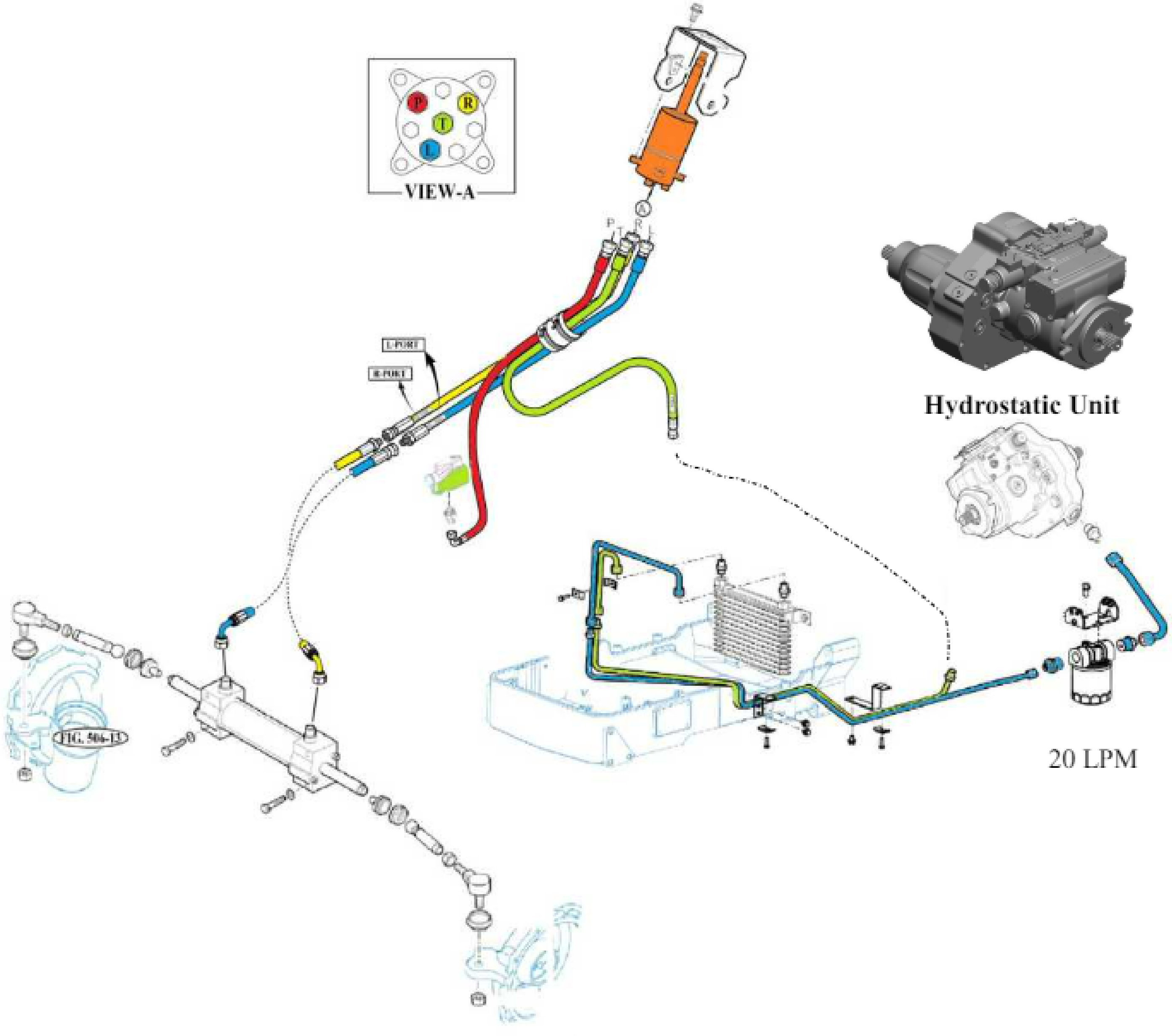


Fig.8-1

SECTION 2. SPECIFICATIONS

1) POWER STEERING GEAR PUMP

MODEL		**2655 HST**	
Delivery (cc/rev)		**8** cc/rev (ℓ/min)	
Pump performance	142.7 (kgf/cm^2)	2300 rpm	18 LPM
Maximum pressure (kgf/㎠)		210 kgf/㎠	
Rated operation speed (rpm)		817~2725 rpm	
Rotation direction		C.W from the shaft end	
Displacement (LPM)		2300*8=18.4	

2) Power steering valve Unit(Orbitrol)

MODEL	**2655 HST**
Model number	1452-405-400-1B
Displacement (cc/rev)	69
Rated flow (ℓ/min)	16
Maximum system pressure (kgf/㎠)	130 (12.7 Mpa)
Max. back pressure (kgf/㎠)	25 (2.45 MPa)
Max. temperature(℃)	95
Input torque (Kgf.m)	0.1~0.2 kgf.m
Main relief pressure setting (kgf/㎠)	130 kgf/㎠ (at 16ℓ/min)
Recommended filtration (ISO4406)	10 ㎛ Nominal
Weight (kgf)	5.5 (12.12lb)

3) OIL TANK

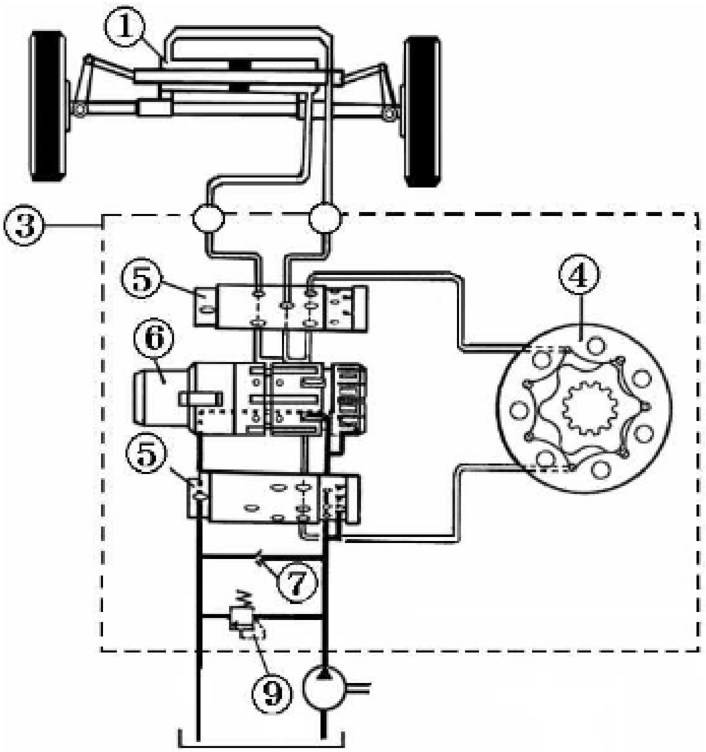
MODEL	**2655 HST**
TANK	Transmission Case
Fluid volume (ℓ)	35ℓ (9.24 US gal)
Fluid	THF500

SECTION 3. FUNCTION

1.Open Center Non Load Reaction

1.Neutral Position

When the steering control valve is in the neutral position, inlet flow (P) from the priority valve moves the flow selector spool against its spring. This flow is blocked at the control valve control spool. The signal port is connected to the reservoir (T) through orifices in the control spool. The priority valve will only supply enough oil to the control valve to compensate for internal leakage and maintain low stand-by pressure. The oil at each side of the steering cylinder is connected to each side of the metering pump, this allows a degree of self centering when turning out of a bend.



①Steering cylinder
③Steering unit
④rotor
⑤sleeve
⑥Main spool
⑦Check valve
⑨Main relief valve

Fig.8-2 Neutral position

2) Right Turn

When the steering control valve shaft is rotated to the right, the control valve moves off center. This connects the inlet port (P) to one port of each metering pump section and also connects the other port of each metering pump section to the cylinder. The amount that the spool moves off center depends on how fast the steering wheel is rotated and also how much effort is required to turn the wheel.

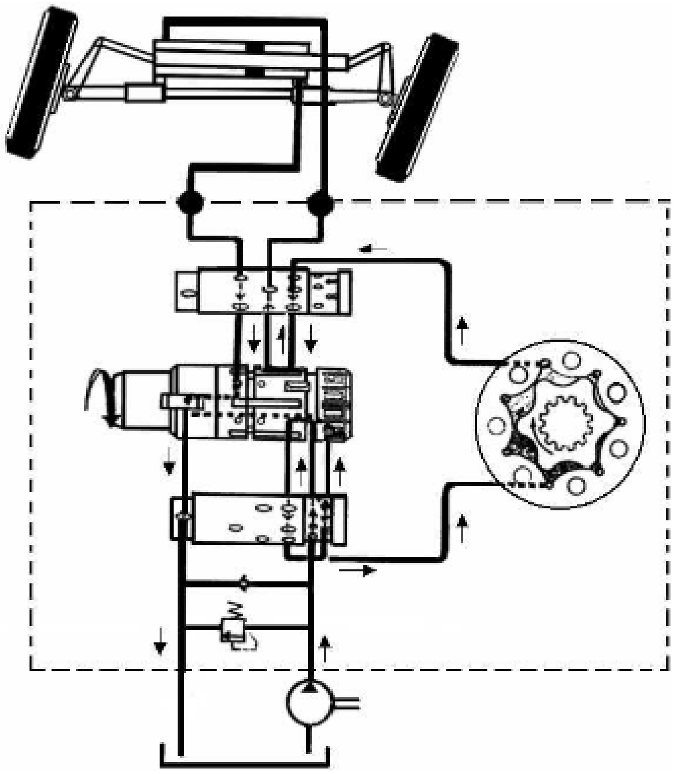


Fig.8-3 Right turn position

3)Left turn

When the steering control valve shaft is rotated to the left, the control valve spool moves off center. This connects the inlet port (P) to the one port of each metering pump section and also connects the other port of each metering pump section to the cylinder. The amount that the spool shifts off center depends on how fast the steering wheel is turned and how much effort is required to turn the wheel.

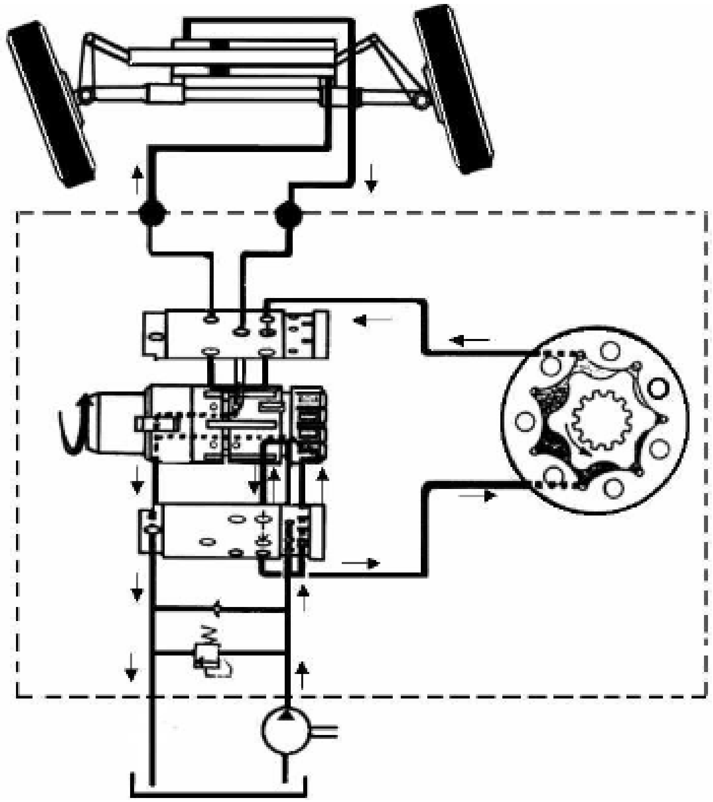


Fig. 8-4 Left turn position

4) Manual steering

When there is no piston pump supply pressure the flow selector is moved to the left by its spring. This connects together the inlet and outlet ports of the lower gyrator pump and disconnects this pump from the system. When the steering is operated manually, only the upper gyrator pump section is used to direct flow to the steering cylinder. This reduces operator effort to an acceptable level, however the number of turns from lock to lock is increased.

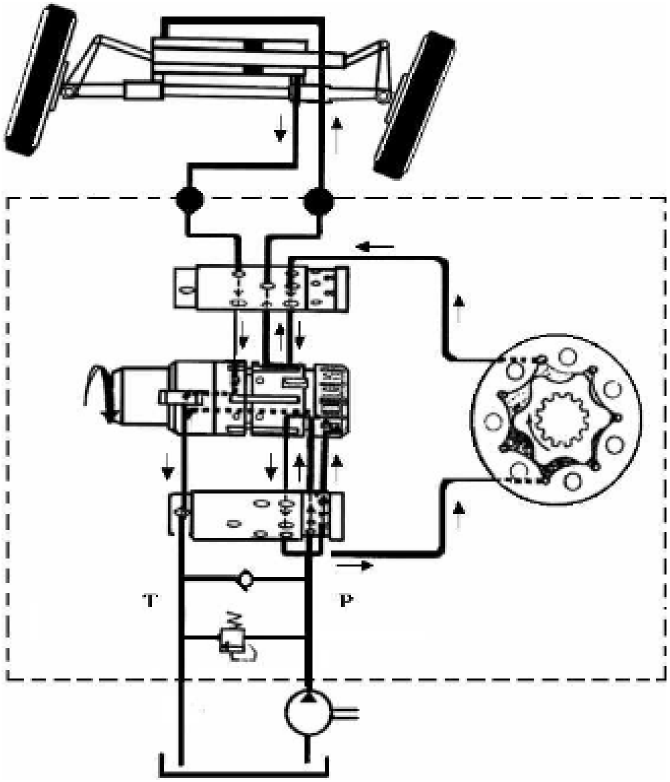
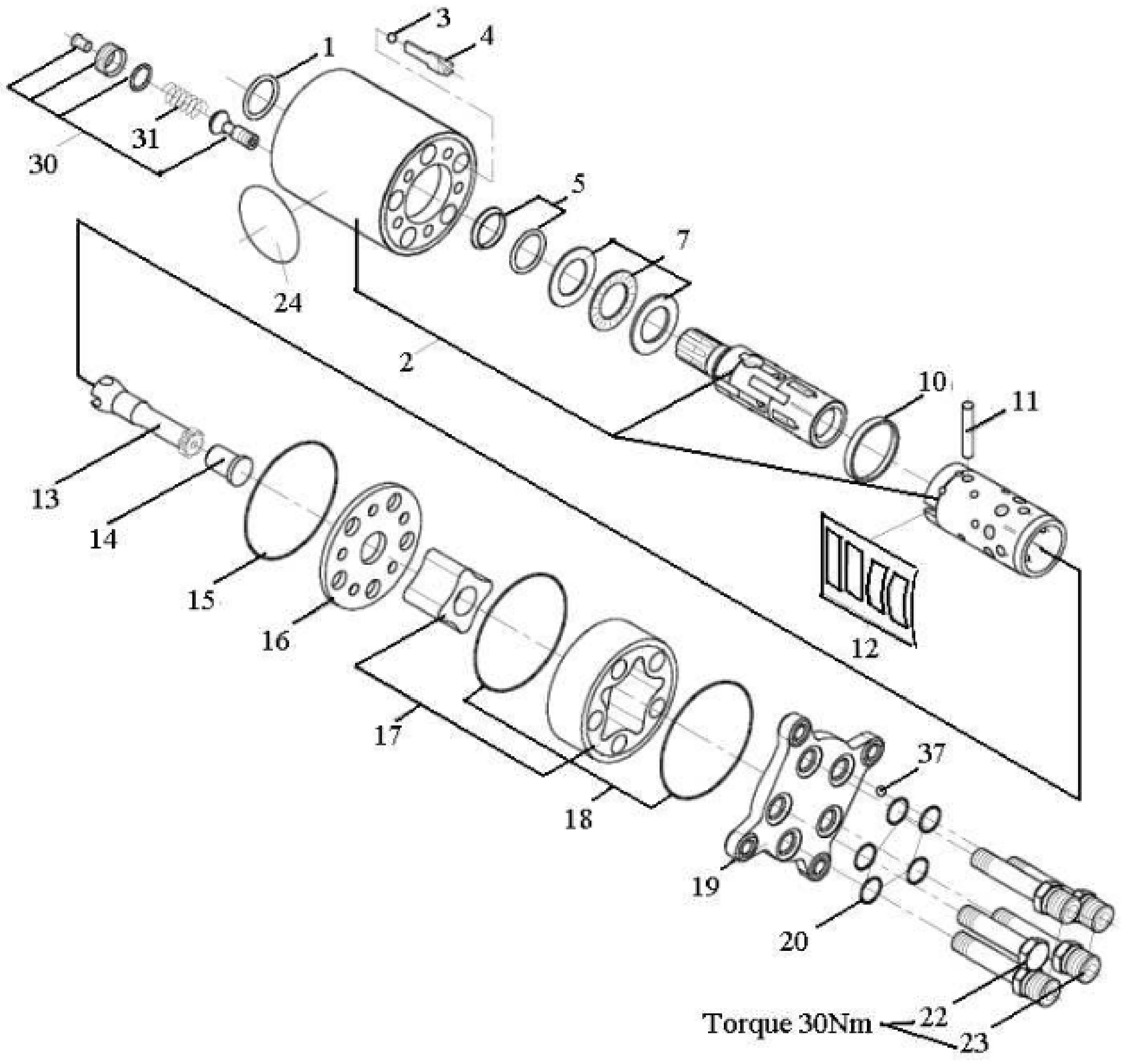


Fig. 8-5 Manual steering

SECTION 4. Disassembly, Inspection, And Reassembly

1. Major component of steering valve (Orbitrol)



1.Dust seal ring 2. Housing spool and sleeve 3.Ball 4. Ball stop 5.Shaft seal 7.Bearing 10.Ring

11. Cross pin 12.Set of springs 13.Cardan shaft 14.Spacer 15.O-ring 16. Distributor plate

17.Gear wheel set 18.O-ring 19.End cover 20.O-ring 22.Special screw 23. Special screw

24. Name plate 30.Complete relief valve.

Fig. 8-6

2.SPECIAL TOOLS

A. Holding tool, code no. SJ150L9001-01

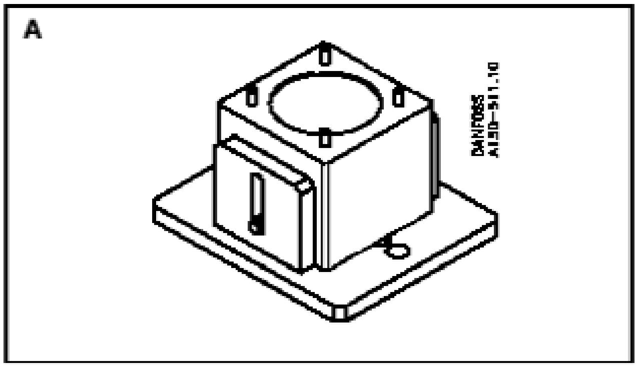


Fig. 8-7

B .Assembly tool for shaft seal ø17.5,

code no. code no. SJ150L4011 - 01

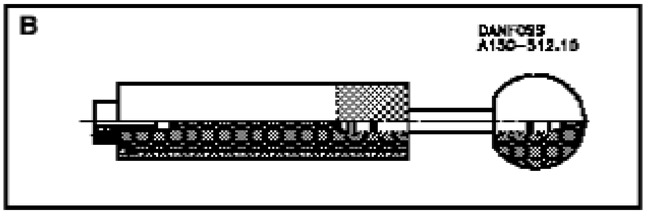


Fig. 8-8

C. Assembly tool for shaft seal ø19,2,

code no. SJ150L4012 - 01

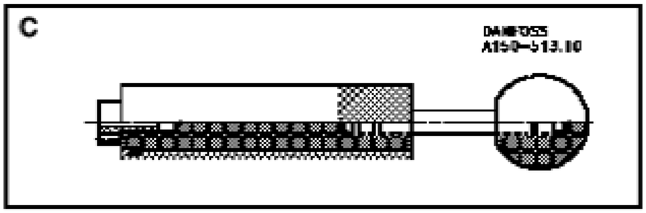


Fig. 8-9

D .Assembly tool for dust seal ring,

code no. SJ150L0396 -01

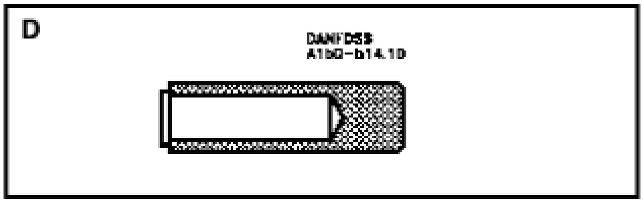


Fig. 8-10

E. Pliers for piston in pressure relief valve,

code no. SJ150-9000 -25

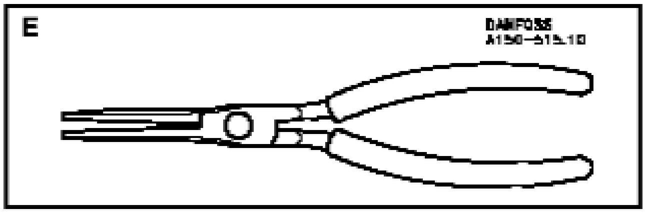


Fig. 8-11

F. Fork for fitting cardan shaft (OMM)
SJ 151G9000 -1

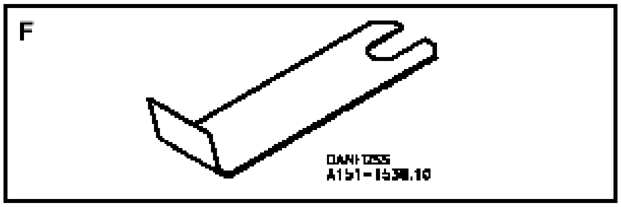


Fig. 8-12

G .Ordinary hand tools.

Socket spanner (5/8 in)

Ratchet spanner, 1/2”

Torque wrench: 0-70 Nm (0-7 da Nm)

Allen keys: 5 & 8 mm a/flats

Small screwdriver, ground sharp.

Pincers

3. Disassembly

Separate the orbitrol referring to Fig.8-2 of SECTION .Disassembly, Inspection,And Reassembly 1.Major component of steering valve (orbitrol)

STEP 1.

- Column

If there is a steering column on OSPM, place the unit in the holding tool, on the **four locating pins** with steering column upwards. Dismantle the steering column.

STEP 2.

-Pressure relief valve (30, 31)

If there is a pressure relief valve in OSPM, remove the plastic plug from the adjusting screw and unscrew with the 5 mm a/flats Allen key. Remove the spring and use special pliers-lift the valve cone out of the housing.

Lift OPSM clear of the holding tool, turn it so that the output shaft points downwards and place it in the holding tool again.

Note, the locating pin in the tool must engage with the OSPM housing.

STEP 3.
-Special. Screws (22, 23)
Remove the screws with a 16 mm a/flats (5/8") spanner.

-End cover (19)
Remove end cover sideways.

STEP 4.
-Gear wheel set (17, 18)
Hold a hand under the gearwheel set to keep the gearwheel from falling out.
Remove O-rings.

STEP 5.
-Distributor plate (16)
Remove distributor plate.

- Cardan shaft (13)
Remove cardan shaft.

STEP 6.
-O-ring (15)
Remove O-ring from housing.

-Balls and ball stop (3, 4, 37)
Shake out check valve ball (not in all units), ball stop and emergency steering ball. Use pincers if necessary.

STEP 7.
Place the OSPM in the tool again. Lift up steering unit and fixture in one piece and turn it 90° to horizontal.

-Housing/spool/sleeve (2)
Turn the spool set so that the pin in spool and sleeve is horizontal and push it out

STEP 8.
-Bearing (7)
Remove bearing from shaft end.
The outer washer may sometimes adhere to the housing. If the washer does not come out with the shaft, it will come out when shaft seal item 5 is being pressed out.

-Ring(10)
Remove retaining ring for the neutral position springs.

STEP 9.
-Cross pin(11)
Press the pin out of the spool set.
Carefully press the spool out of the sleeve.

-Springs (12)
Press the neutral position springs out of the spool.

-Dust seal (1)
Remove the dust seal ring (with a "sharp" screwdriver).

-Shaft seal (5)
Remove the shaft seal (with a "sharp" screwdriver if necessary).

4. Cleaning, inspection, replacement and lubrication

Note:
a. Clean all parts carefully.
b. Carefully check all parts and replace imperfect parts, if any.
c. Always replace all sealing parts during a repair.
d. Before assembly, lubricate all parts with hydraulic oil and grease rubber parts with Vaseline.

5.REASSEMBLY

STEP 1.
-Housing (2)
Place the OSPM housing horizontally in the holding tool, with the hole for the output shaft facing the tool.

Note: the locating pin in the tool must engage with in the OSPM housing.

STEP 2.
-Shaft seal (5)

With the assembly tool the shaft seal must into the housing.
Note that the small guide piece at the front of the tool must remain in the hole for the output shaft when the tool itself is drawn out of the housing.

Note: there are two different tools:
One for housings for steering column mounting (SJ150L4011-01)
One for housings with integrated steering column (SJ150L4012-01).

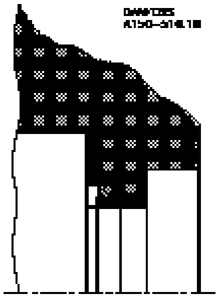


Fig. 8-13

STEP 3
-Spool/sleeve (2)
Guide spool and sleeve together, turn the spools so that the key slots are opposite each other.

STEP 4.
-Springs (12)

Insert the curved springs between the flat springs and push them into place (see sketch).

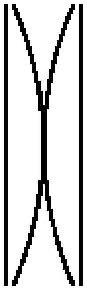


Fig. 8-14

STEP 5.

Spring retaining ring (10)

Center the springs in the spool/sleeve set and guide the ring down over the sleeve.

Note: The ring must be able to rotate unimpeded by the springs.

STEP 6

-Cross pin (11)
Fit the cross pin in the spool set.

-Thrust bearing (7)
Fit the thick race, needle cage and thin race. Lubricate the output shaft on the inner spool with Molykote PG plastslip 75,on the surface in contact with the shaft seal.

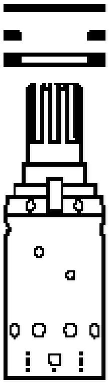


Fig. 8-15

STEP 7
-Housing /spool/sleeve (2)

a. With the housing still horizontal in the holding tool - secure it with one hand. With the other hand take the assembled spool/sleeve set, making sure two fingers hold the cross pin (11) in position. Guide the spool set into the housing with the cross pin (11) horizontal.

Note:
Be careful with the small guide piece from mounting of the shaft seal.
With it is pressed out by the shaft rotary.

b. With housing and spool set remaining in the tool, lift the whole unit into vertical position. The pin in the spool set must now point towards port P in the housing, either at 6 o'clock or 12 o'clock.

STEP 8.
-Ball (3)
Place the emergency steering ball in port P.

-Ball stop (4)
Place the ball stop in port P.

-Ball (37)
Place the check valve ball (if required) in port P

STEP 9.

-O-ring (15)
Fit the O-ring in the housing.

-Distributor plate (16)
Place the distributor plate on the housing.
Turn it so that the holes line up.

STEP 10
-Cardan shaft(13)
Fit the cardan shaft into the inner spool and allow it to engage with the pin.

If so required use fork SJ 151G9000-1to retain the cardan shaft.

STEP 11
17 Gear wheel
When fitting the gearwheel, it must be oriented correctly so that it engages with the cardan shaft.

The cross pin (11) in the spool set must line up with the bottom of the teeth in the star
(see sketch).

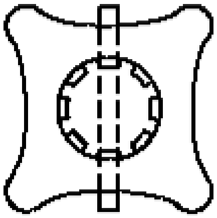


Fig. 8-16

STEP 12
-O-rings (18)
Place the O-rings in the grooves on each side of the gearwheel rim.

-Gear ring (17)
Place the gearwheel rim over the distributor plate so that all holes are in line with each other.

STEP 13.
-Spacer (14)
Place the spacer over the cardan shaft.

-End cover (19)
Place the cover so that the hole marked "P" lines up with port P in the housing("6 o'clock " or "12 o'clock").

STEP 14.
-Special screws (20, 22,23)
Fit screws (with O-rings). Remove the retainer fork. Tighten all five screws (cross pattern) with 30 ± 3 Nm (3 daNm).

Note:
With open center units, the screw with no oil flow connection must be fitted in port E.

If the OSPM must be mounted with a Pressure relief valve, lift it out of the tool and place it on the four pins with the axle journals upwards.

STEP 15.
-Piston (30)
Fit the piston.
-Spring (31)
Fit the spring.

STEP 16.
-Adjustment (30)
Screw in the adjusting screw.

STEP 17. (Test)

a. Lift OSPM out of the tool and prepare it for testing.
The pressure relief valve can be set either on a test panel or in a system with pressure-gauge read-off.
b. Insert plastic plug.

STEP 18.
Dust seal (1)
Guide the dust seal ring down over the shaft end press into place in the housing with assembly tool. SJ 150L0396 - 01.

Note: The dust seal must be fitted after testing so that any leakage from the shaft seal can be detected.

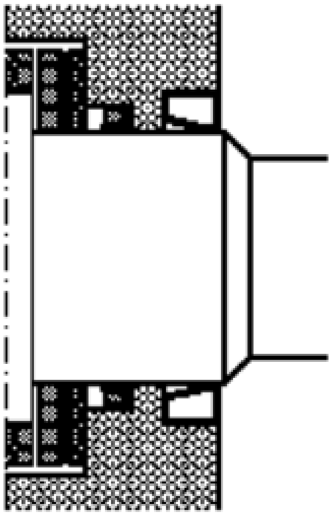


Fig. 8-17

SECTION 5. TROUBLESHOOTING

Problems and probable causes	Counter measures
1. Steering wheel is very heavy to turn	
1) Poor assemble between steering column and unit.	
(1) Spline of column and unit are assembled tightly.	-Replace column spline
(2) Spool of unit is seized by spline of column .	-Check column assembly face and spline length (MAX 6.5㎜)
(3) Poor rotation of column	-Replenish oil or Exchange
2) Insufficient pump pressure or fluid volume	
(1) Check pump delivery (Unit volume×120 rpm×1.15)	-Exchange pump
(2) Check oil tank fluid volume	-Replenish oil
(3) Check pump pressure	-Adjust relief pressure
3)Trouble internal steering unit valve	
(1) Low setting pressure of relief valve	-Adjust fluid level properly
(2) Ball-nut heavy to work	-Wash clean or replace
4)Trouble machine mechanism.	
(1) Poor link work	-Wash and replenish oil
(2) Excessive sector gear pre-load	-Adjust backlash
2. Return to neutral is too slow	
1) Poor assemble steering column and unit	
(1) Poor assemble to center between column and unit	-Loosen the bolt and fix again with center
(2) Column assembly face depressed unit bushing	-Replace column or repair
2) Depressed control set (spool+sleeve)	
(1) Excessive fluid volume	-Adjust fluid level properly
(2) Excessive pressure	-Adjust pressure
(3) Dust	-Wash
3) High pressure ratio of "T" port (tank port)	
(1) Tank port hall is small	-MAX. Pressure ratio 20 bar
(2) Tank port pipe is linked to other lines	-Wash and clean pipe line -Separate unit pipe line and reinstall

Problems and probable causes	Counter measures

3. Free play of steering wheel

1)Too low elastic of centering spring (Remove P port pipe line and check left and right turning) (1)Damaged spring or poor elastic	-Replace spring
2) Depressed control set	
(1) Excessive fluid and pressure	-Adjust fluid level and pressure properly
(2) Depressed by foreign material	-Wash
(3) Depressed from external when assemble with column	-Check column and adjust

4. Steering wheel resistance with turning

(1)Worn of spline gear column	-Replace column
(2)Depressed control set	-Wash,and Adjust fluid level and pressure properly
(3)Air trapped in cylinder and pipe line	-Deflate the air
(4)Excessive backlash column	-Adjust column
(5)Poor turning of column, or wear of bearing .	-Replace column and replenish oil

5.Too much free play of steering wheel (Rough touching on tire causes vibration)

(1)Air trapped in steering cylinder and pipe line.	-Deflate the air
(2)Worn ball bearing	-Replace

6.Free play steering wheel

(1)Insufficient oil in the tank	-Replenish oil
(2)Worn,damage steering cylinder	-Replace oil seal and cylinder
(3)Loose spacer in unit	-assemble spacer parts.

7.Kick-back of steering wheel

(1)Loose check valve in "P" port or don't operate	-Adjust check valve
(2) Trouble in system	-consult workshop

Problems and probable causes	Counter measures

8.Serious kick-back each side

(1)Poor assemble the gyrator lower the unit	-Reassemble

9. Steering wheel is very heavy to begin turning

(1)Oil density is too high or cool	-Replace oil

10. External Oil leakage

(1)column	-Replace oil seal, slide ring
(2)End cap gyrator	-Replace o-ring
(3)Tightening Bolt	-Replace copper washer (Torque 1st:175 kgf·cm. 2nd:280 kgf·cm)

Chapter 9
Hydraulic system

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Chapter 9 Hydraulic system

SECTION 1. GENERAL DESCRIPTION

The hydraulic system is composed of a gear pump, valves, oil filter, cylinder (actuator), piping, etc.

The implement lift is operated by a control valve which is actuated by the control lever through a link mechanism.

ON and OFF of the PTO is controlled by a hydraulic, wet,multi-disc clutch whose circuit is opened and closed by an electromagnetic valve in the flow-divider.

The construction and circuit of the hydraulic system are shown in Fig.9-1 and 9-2

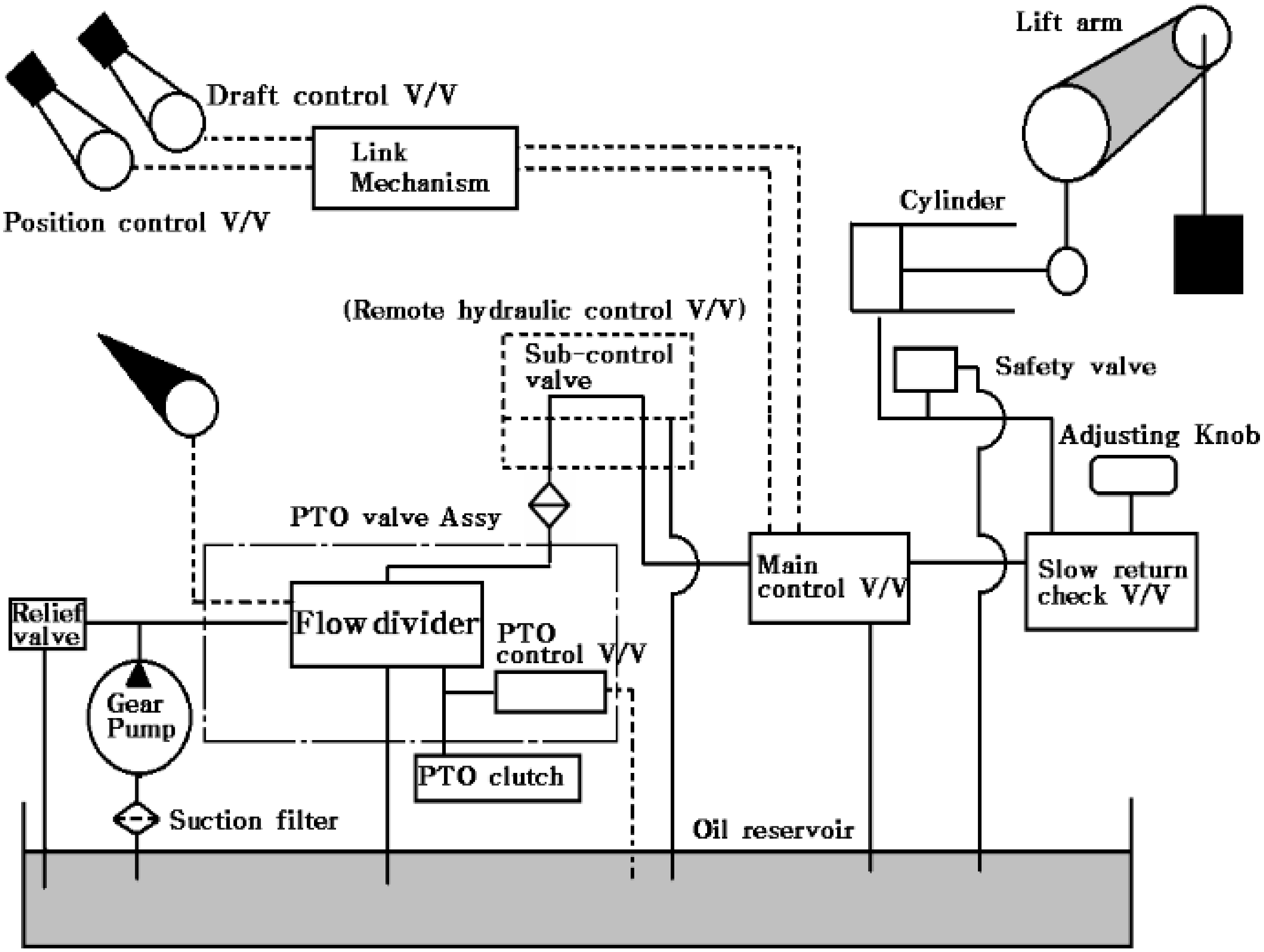


Fig.9-1 hydraulic system construction

2655 HST Hydraulic Circuit

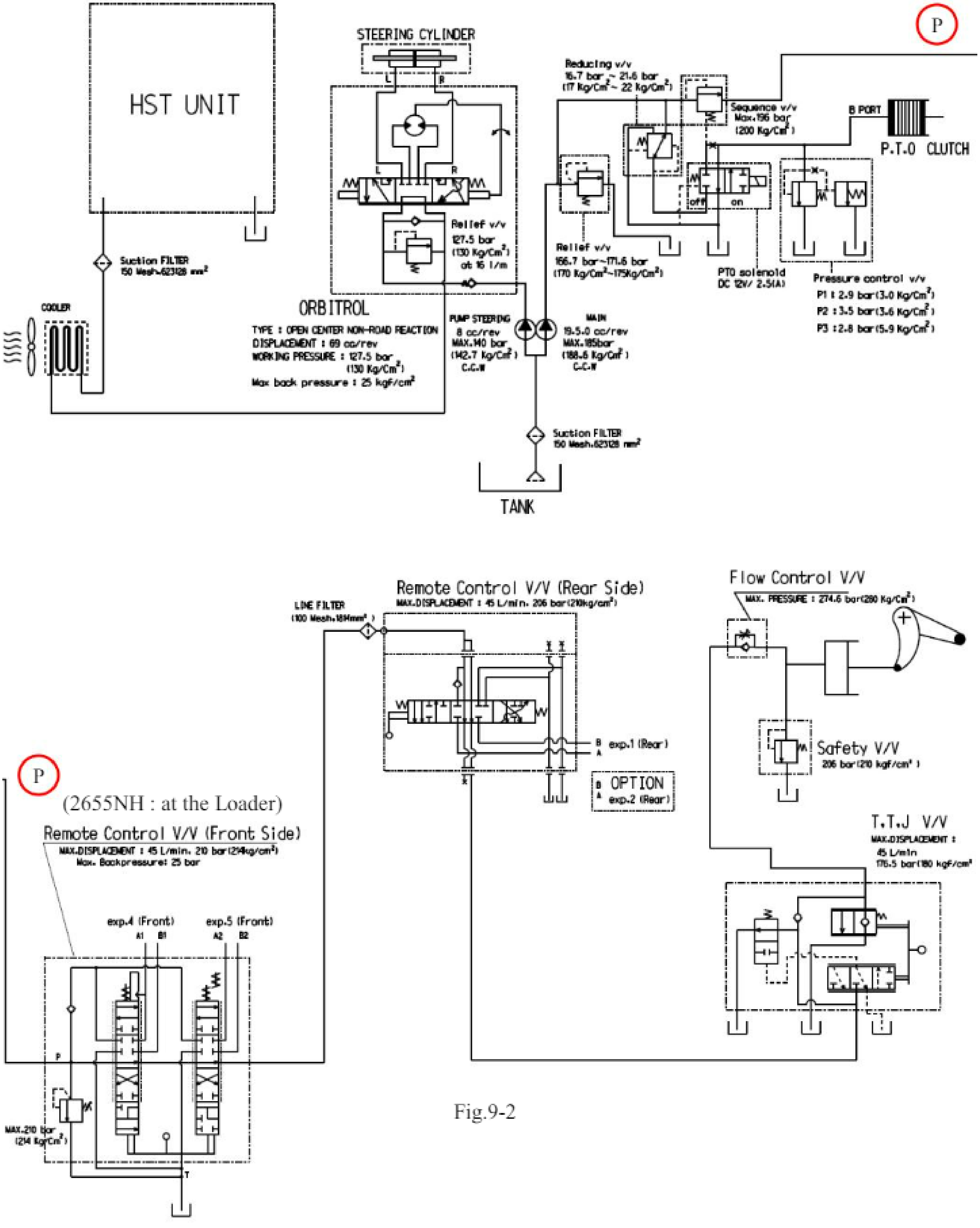


Fig.9-2

SECTION 2.SPECIFICATIONS

<table>
<tr><th colspan="2">MODEL</th><th colspan="2">2655 HST</th></tr>
<tr><td>Piston and cylinder</td><td>Lift
(at lower link top end/at 24inch link end)</td><td colspan="2">1503 Kgf
(1336kgf)</td></tr>
<tr><td>Control valve</td><td>Cylinder port leaks (under a pressure of 9800KPa[(100Kgf/㎠) with gear oil of SAE 80)]</td><td colspan="2">5cc(0.305 Cu in)</td></tr>
<tr><td rowspan="2">Main relief valve</td><td>Maximum pressure</td><td colspan="2">214 Kgf/㎠</td></tr>
<tr><td>Relief pressure</td><td colspan="2">170~175 Kgf/㎠</td></tr>
<tr><td rowspan="3">Gear pump</td><td></td><td>Main</td><td>Steering</td></tr>
<tr><td>Delivery :
Liter (cu.in) min at Rated rpm : :2300rpm</td><td>44
ℓ /min</td><td>18
ℓ /min</td></tr>
<tr><td>Working pressure (bar)</td><td>185 ± 7</td><td>140</td></tr>
<tr><td rowspan="5">Suction filter</td><td>Rated flow: (ℓ /min)</td><td colspan="2">43</td></tr>
<tr><td>Filtration density</td><td colspan="2">150 mesh</td></tr>
<tr><td>Filtration area</td><td colspan="2">6231 ㎠</td></tr>
<tr><td>Relief valve pressure</td><td colspan="2">0.9~1.2 kgf/cm^2</td></tr>
<tr><td>Connector</td><td colspan="2">1 ¼ - 12 UNF</td></tr>
<tr><td rowspan="2">Line filter</td><td>Rated flow: (ℓ /min)</td><td colspan="2">35</td></tr>
<tr><td>Filtration density</td><td colspan="2">100 mesh</td></tr>
</table>

NOTE:

Recommendable Transmission oil

Manufacturer	:Product
CALTEX	:Textran TDH Premium
Texaco	:TDH oil
Chevron	:Chevron 1000THF
ESSO	:Torque Fluid 56
MOBIL	:Mobil fluid 423
SHELL	:Donax TD
CASTROL	:CASTROL AGRI MULTITRANS
TOTAL	:Transmission MP

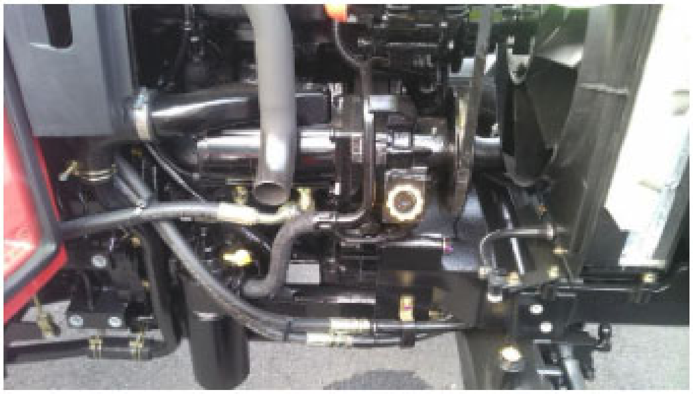


Fig.9-3

1.HYDRAULIC SYSTEM

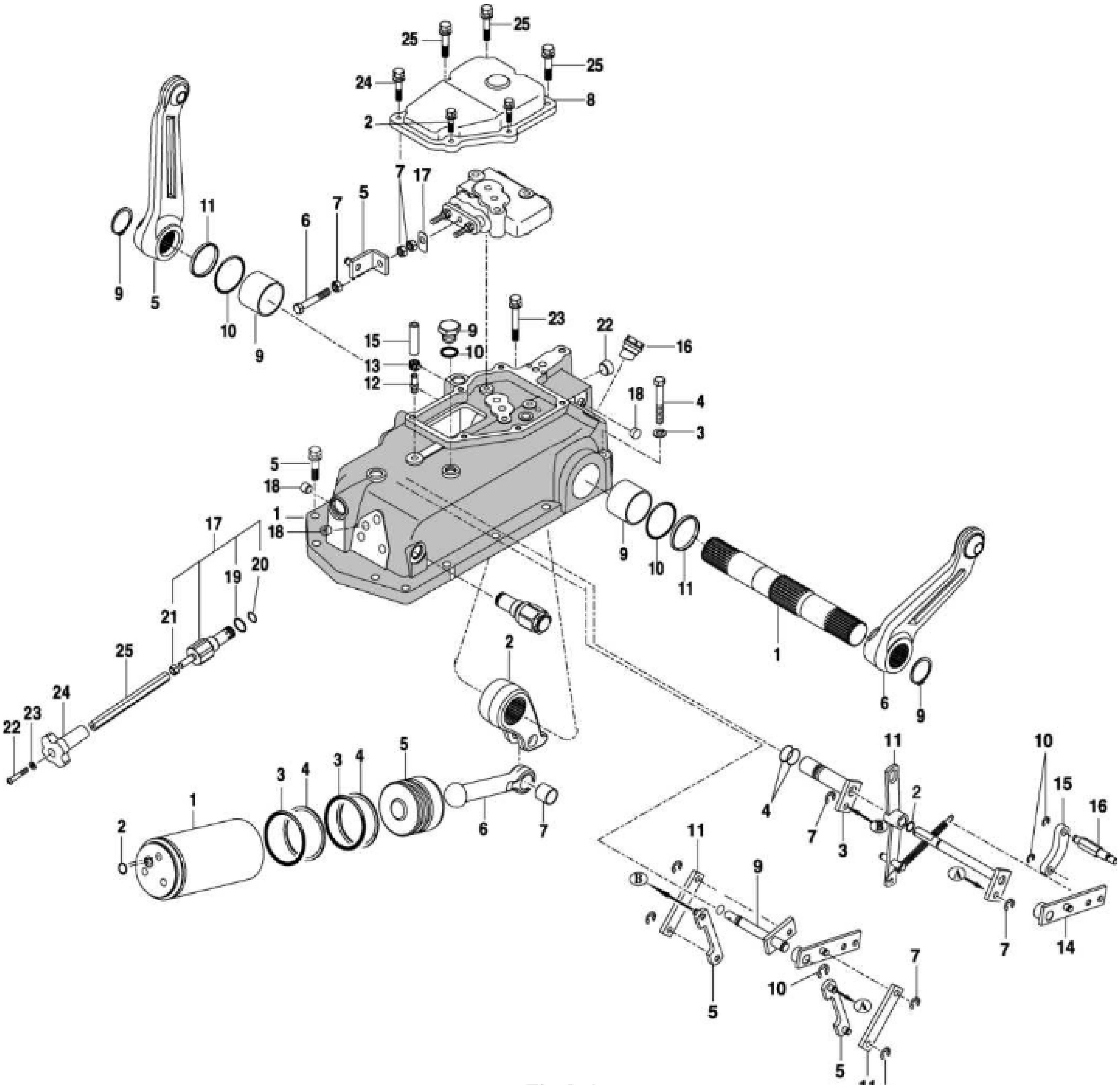


Fig.9-4

2.DISASSEMBLY

1)Remove the cylinder case assembly, referring to relevant paragraph in Chapter 2.

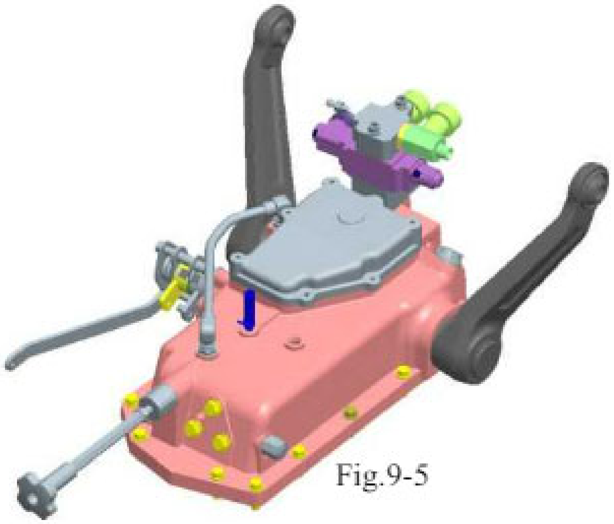


Fig.9-5

Note:
Put the cylinder case on a wooden plank to prevent the surface from damage.

2) Remove the link pin and extract the related Lift link (Option).

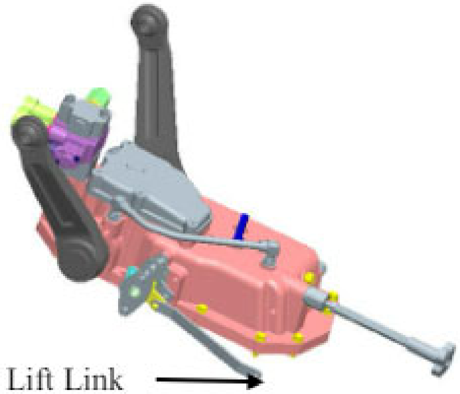


Fig.9-6

3) Remove the cylinder head and extract the cylinder. Then remove the piston from the cylinder.

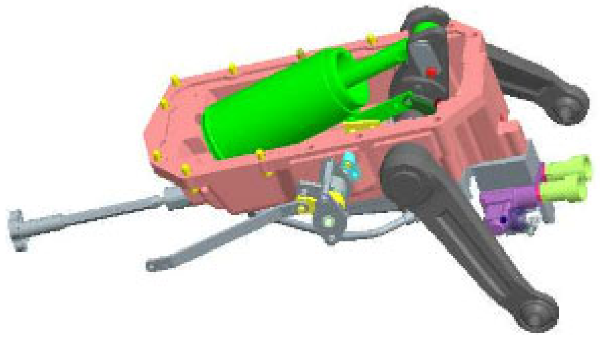


Fig.9-7

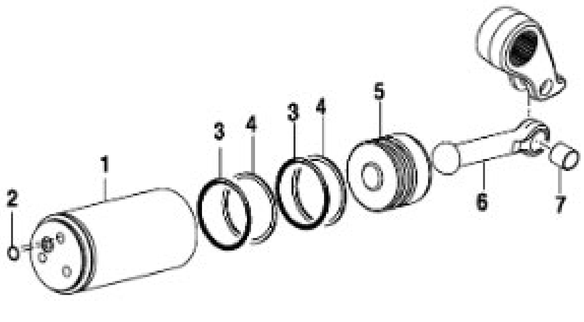


Fig.9-8

4) Applying aligning marks on the Lift shaft(26) and right hand lift arm(19),Then remove the arm

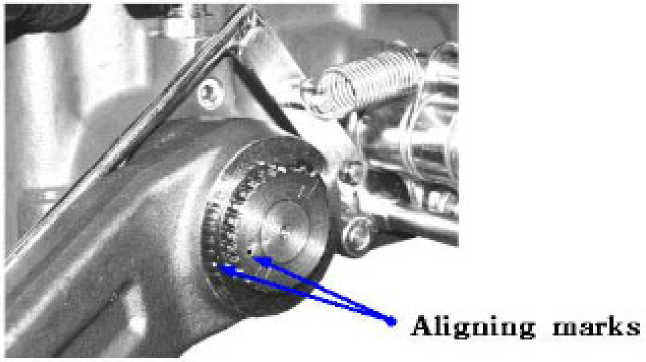


Fig.9-9

5) Applying aligning marks on the Draft shaft And Draft arm ,Then remove the shaft

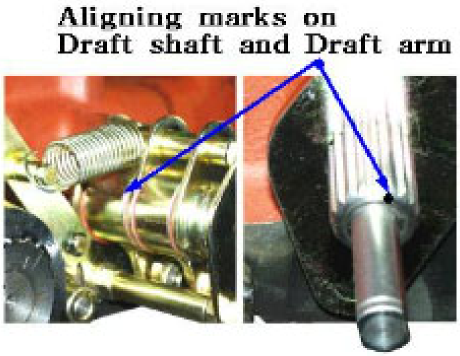


Fig.9-10

6) Applying aligning marks on the Lift crank And Bar ,Then remove Bar

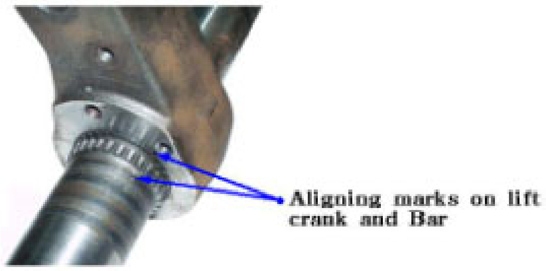


Fig.9-11

7) Remove the set bolt for the lift crank and remove the assembly of the lift shaft and lift arm.

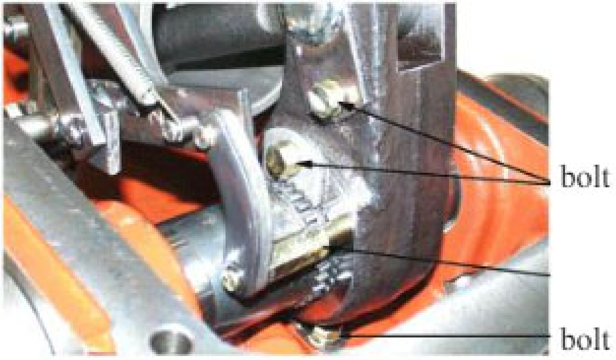


Fig.9-12

8) Remove the assembly of the lift crank and piston rod.

9) Unhook the each link parts and remove the cover main control valve

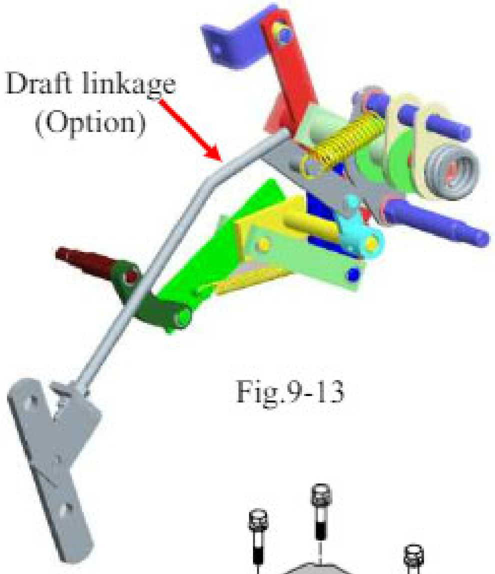


Fig.9-13

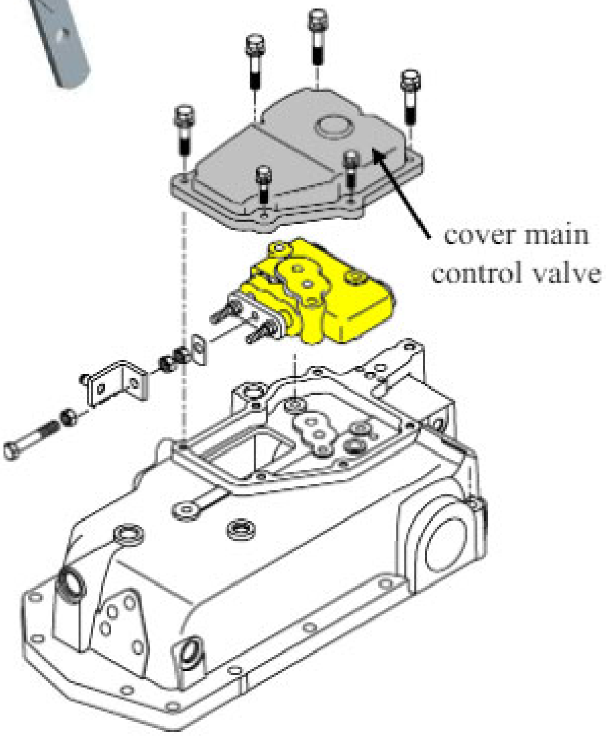


Fig.9-14

10) Remove the bolt and extract the main control valve

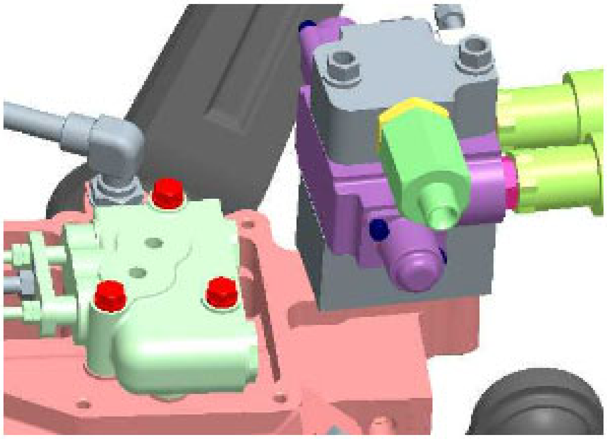


Fig.9-15

11) Remove the following linkages:
   a. Each linkage
   b. position control linkage
   c. Draft control linkage

3.REASSEMBLY

Reassemble in reverse order of disassembly.

3.1 GENERAL PRECAUTIONS

1) Hydraulic system parts should completely be free from dust before reassembly.
2) All O-rings should be replaced with new ones, which should be lubricated with grease before installation.
3) When the lift shaft is removed, the oil seal should also be replaced with a new one.
4) Install the piston from the cylinder bottom side. The O-ring and and back up ring should be coated with grease ahead of time. Install with care so as not to damage them.

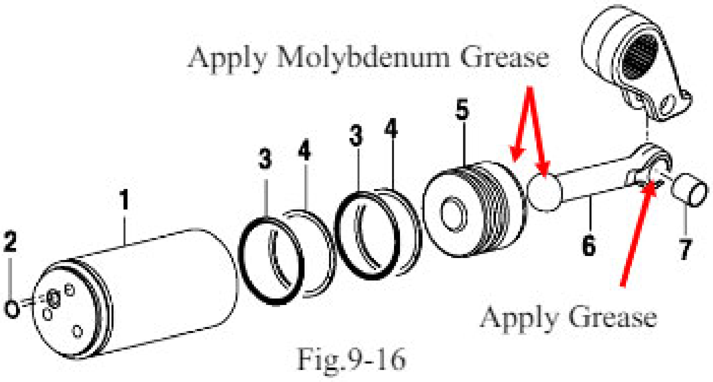


Fig.9-16

5) When assembling the lift crank on the lift shaft,mesh their splines using the alignment marks which were put their before Disassembly

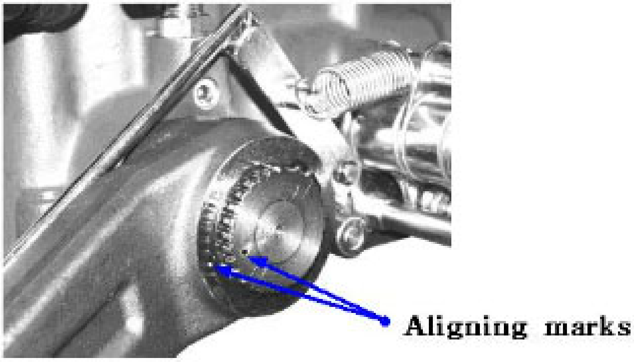


Fig.9-17

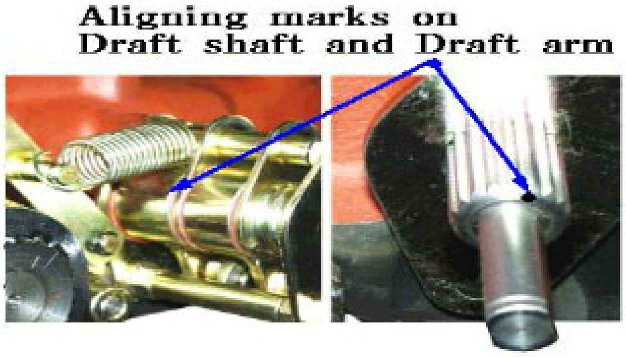


Fig.9-18

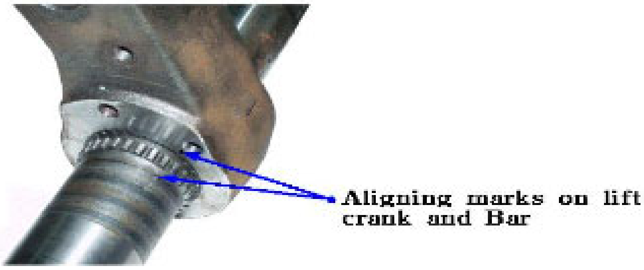


Fig.9-19

6) Tighten the Main valve securely to the specified torque

Tightening torque	130~180 Kg.cm

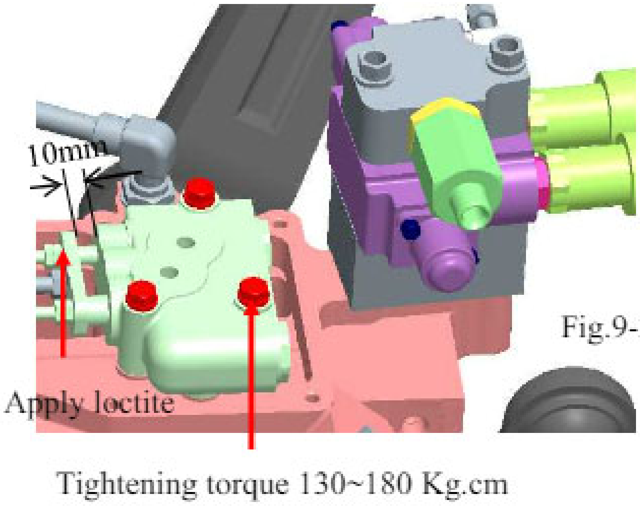


Fig.9-20

7) When installing the control valve,apply grease to the o-rings and avoid their dislocation or binding during tightening the valve to the specified torque

8) Tighten the slow return check valve to the specified torque

Tightening torque	1000~1200 Kg.cm

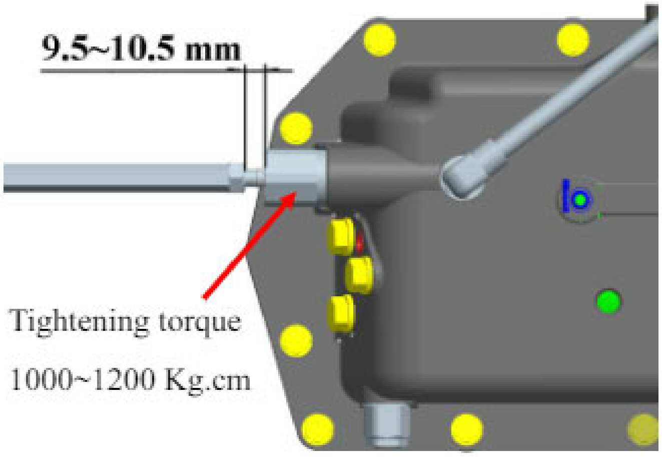


Fig.9-21

9) Tighten the Exterior valve (remote control valve) to the specified torque

Tightening torque	200~250 Kg.cm

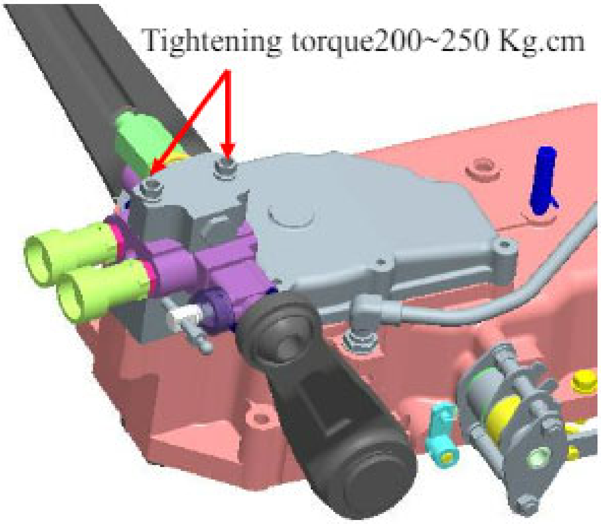


Fig.9-22

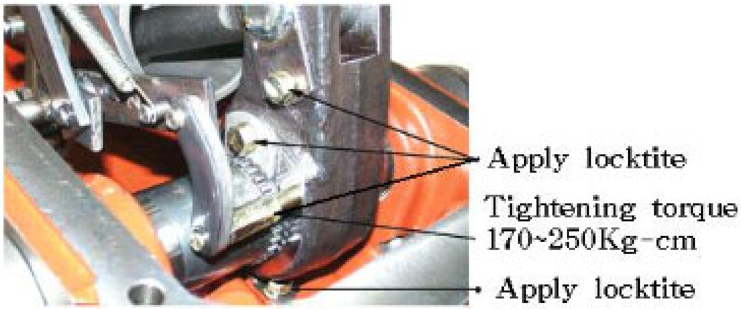


Fig.9-23

3.2 REASSEMBLY STEPS.

1) Install the main control valve

2) Install the clevis comp.

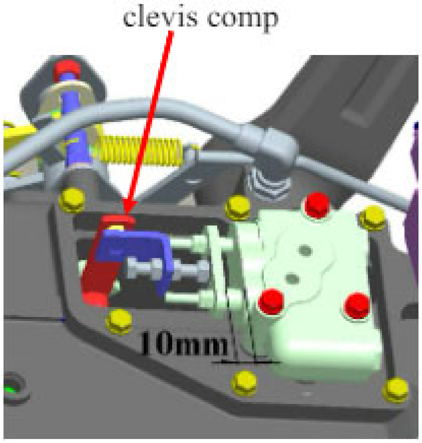


Fig.9-24

Note:
After installing the clevis to main control valve ,make the installed length of the set the body and plate to be 10mm(Fig.9-20)

3) Install the each link parts.

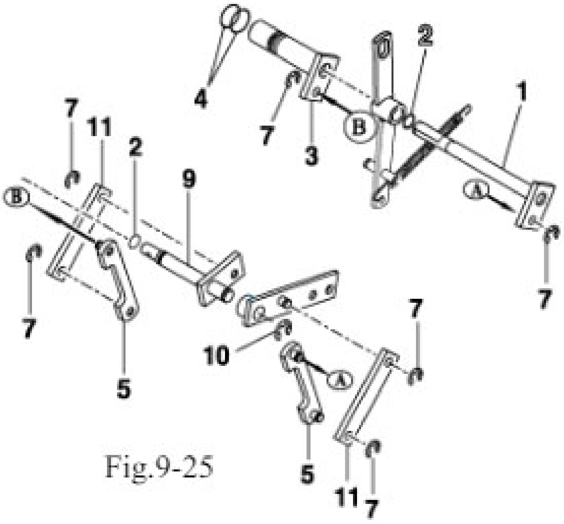


Fig.9-25

4) Install the lift crank temporarily along with the feed back link. Install the piston on the lift crank.

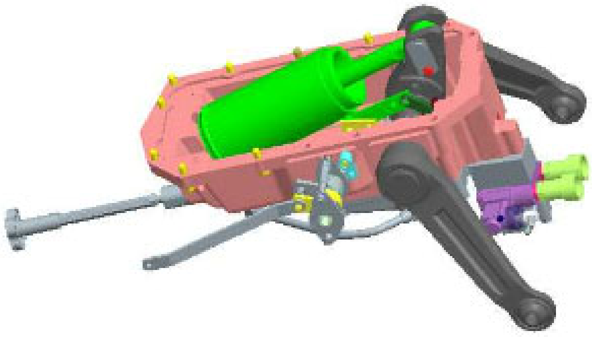


Fig.9-26

5) Install the lift shaft and lift crank together in accordance with the aligning marks on them. (Fig.9-23).Apply grease to the roll bush.

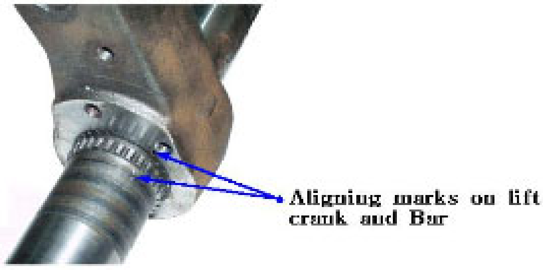


Fig.9-27

6) Drive the oil seal onto the lift shaft and install the lift arm.

Note:
When installing the oil seal, take care not to allow the oil seal lips to be damaged by the splines of the lift shaft.

7) Install the cover main control valve and Then install the remote control valve.

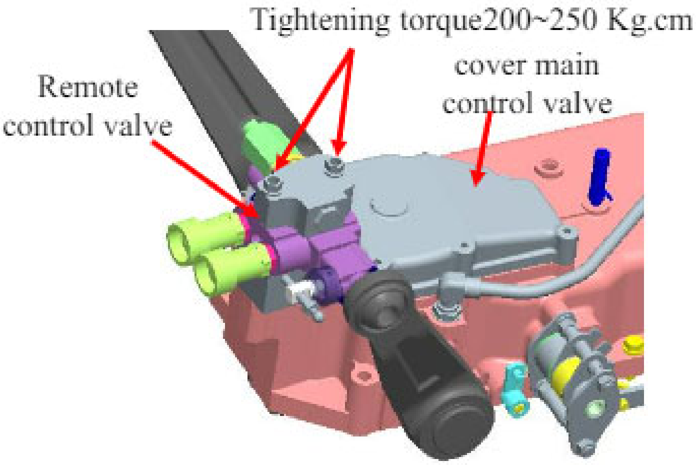


Fig.9-28

4. ADJUSTMENT OF THE LINK MECHANISM.

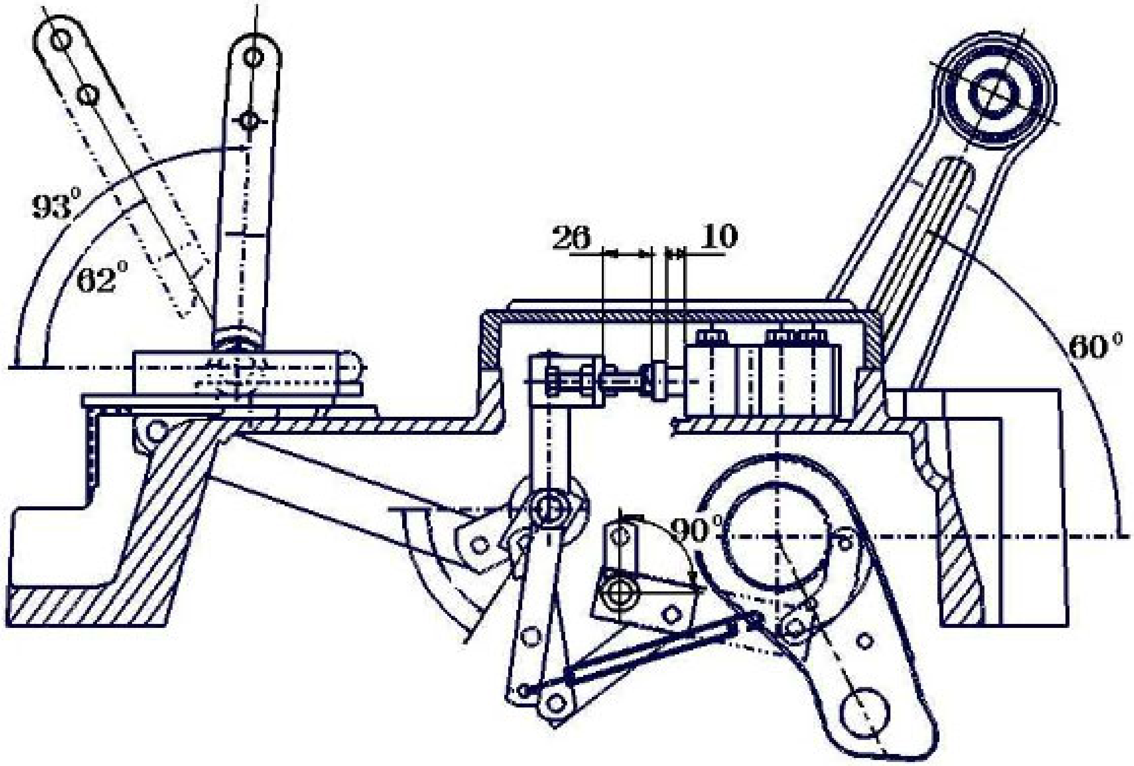


Fig.9-29

1) Adjustment of the position control link mechanism

Place the cylinder case assembly upside so that the lift arm can be moved freely

Point 1.Set the lift crank to the top position.Adjust the top position installed length of the body and plate is about 10mm or determine the position where the angle of the lift arm from horizontal is 60~ 61.5°.

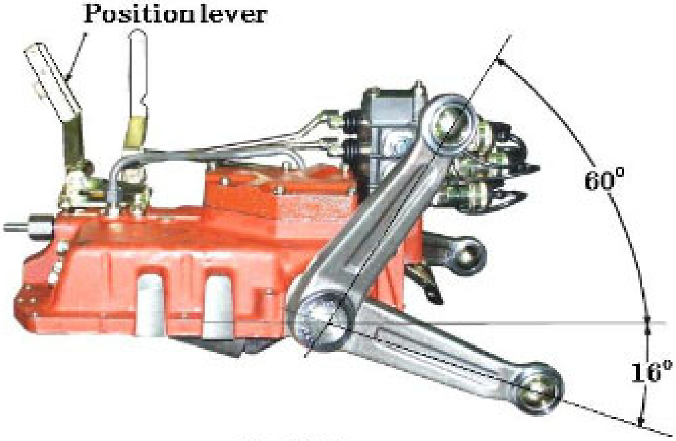


Fig.9-30

Point 2. Fix the clearance between the body and plate on the control valve and the casing spool to be 10 mm,while the gap A should be 26mm (Fig.9-27),while the main spool is set in the neutral position.

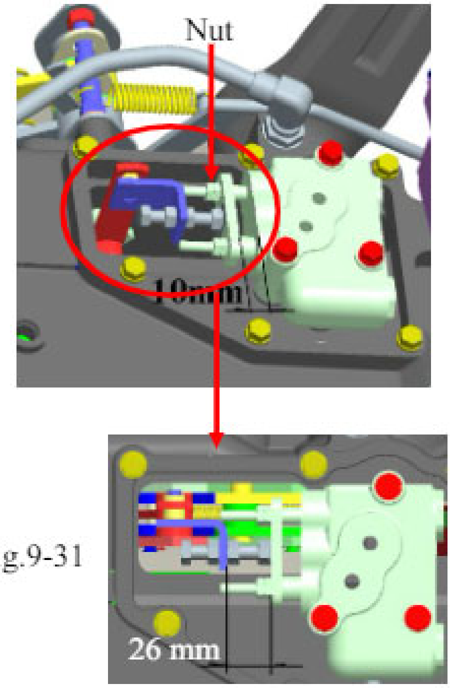


Fig.9-31

Point 3. Set the feed back link so that there is no play by the adjusting nut.

Point 4. Apply an locktite to adjusting Nut.

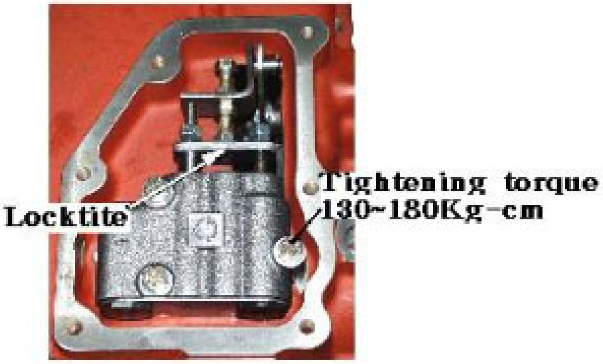


Fig.9-32

Thus the adjustment of the position control linkage is completed.

2) Adjustment of the draft-control link mechanism (Option)

Point 1. Shift the draft-control lever to the top position and the position-control lever to the bottom position.

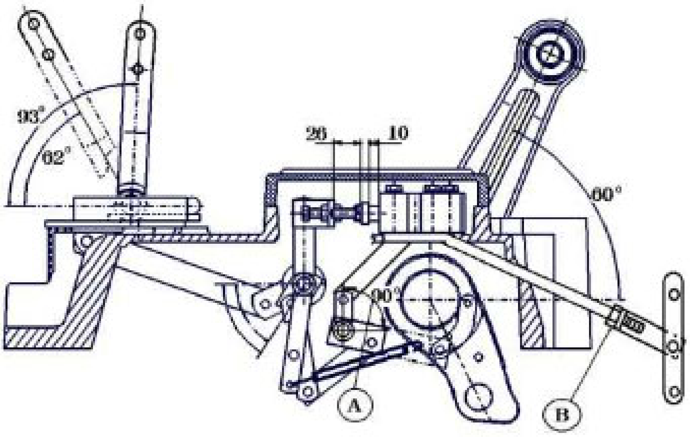


Fig.9-33

Point 2.

With position (A) is 90° together in accordance with Shifting the draft-control lever to the top position and the position- control lever to the bottom position.

Adjust by loosening the lock nut.

Thus the adjustment of the draft-control link mechanism is completed.

SECTION 4. MAJOR COMPONENTS OF THE HYDRAULIC SYSTEM

1. MAIN CONTROL VALVE

1.1 GENERAL DESCRIPTION

This valve controls the lifting and lowering operation of the hydraulic cylinder. It has especially been developed to control the working height of the implement. It consists of a feed back valve; direction control valve, flow-control unloading valve, and holding check valve.

1.2 SPECIFICATIONS

Maximum operating pressure	175 Kgf./㎠
Maximum flow	45 liters/min
C-port leaks	5 cc/min below (Fluid temp : 50℃: Pressure :140 Kgf/㎠)

1.3.CONSTRUCTION

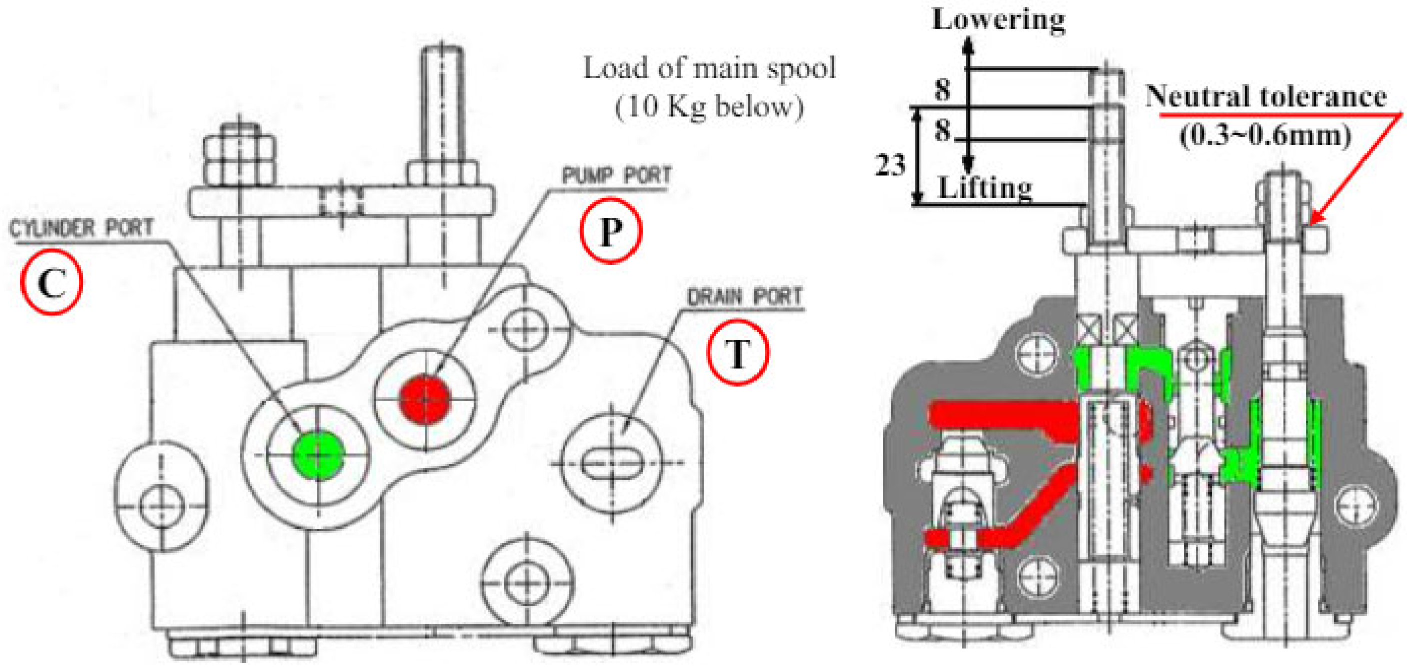
1) Main spool

it consists of a lifting spool, lowing spool and has three functions.

a. It opens and closes passages P to C and C to T and controls the passage wall area successively.

b. It converts unloading pilot pressure to C-port pressure or tank pressure

c. It turns the pilot pressure of the pilot spool on or off.



Load of main spool
(10 Kg below)

Fig.9-34

1.4 OPERATION

Port p means “pump port”, and is connected to the pump, while port C means “Cylinder port”, and is connected to the cylinder. Drain ports T1 to T4 are connected to the tank.

1) Neutral position

In the NEUTRAL position, Spring chamber of unloading valve connected to TANK(T2), Therefore the force imposed upon the right hand side of the unloading valve, then the fluid from the pump flows into TANK(T1).

The pressure in chamber becomes equal to the tank pressure. Consequently the fluid in the C port becomes high, then the check valve and main chec valve completely closes the cylinder circuit enough to hold the piston steady.

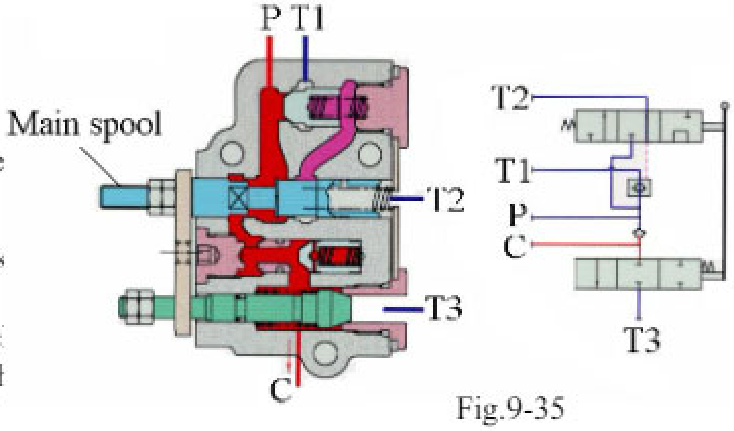


Fig.9-35

2) Lifting position

When the main spool is shifted to the lifting positio Passages to the Tank(T2) are closed with unloading spring and the Fluid from the pump flows into unloading valve spring., therefore the force imposed up the left-hand side of the unloading check valve, Consequently the fluid in the T1 port becomes to close the unloading.

The pump delivery fluid pressure open the loading check valve, then through C port the pump pressure flows into hydraulic cylinder to lift up the lift arm.

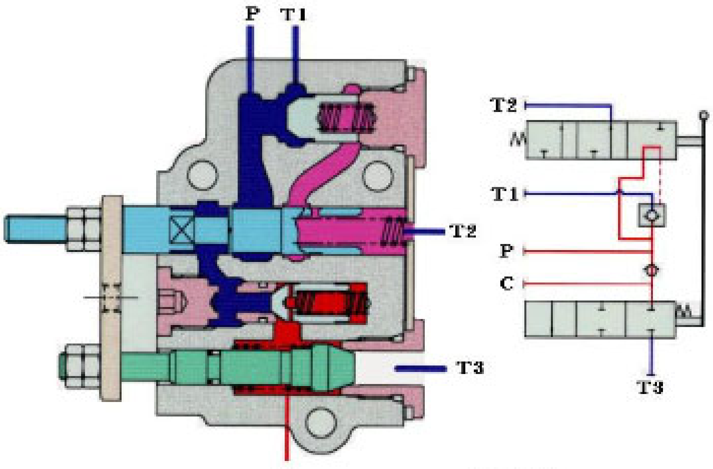


Fig.9-36

3) Lowering position

When Main spool is shifted to the lowering position, Unloading spring is connected to the Tank(T2),and the force imposed up the right hand side of the unloading check, therefore the fluid from the pump flows into the Tank(T1).

Consequently the force imposed up the left hand side of the main check valve, which is connected with Plate-B to open the T3 port.

By this action, the fluid from the cylinder flows out and into the tank through chamber, so the piston is released

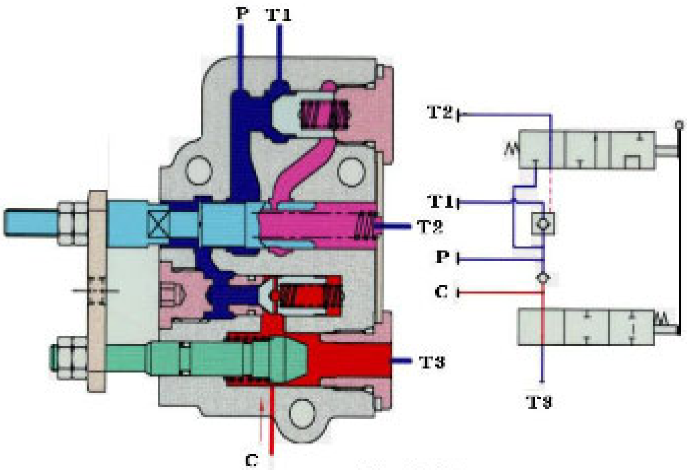


Fig.9-37

1.5. SERVICING INSTRUCTIONS (Reference)

1) Required tools

-6mm, 8mm set screw wrench and torque Wrench

-12mm, 14mm, 27mm spanner and torque wrench

-Conventional screw driver[3mm(0.12 in) in blade width]

2) Tightening torque

Description	Size	Tightening torque Kgf.m
Plug	M22	8.5
Plug	M20	7
Stopper nut	M8	2.3~3

3) Disassembly

-Main spool and related parts.

Remove the nuts and the plugs and draw out the main spool carefully.

Note:

The main spool and spool head are screw-fitted, so they can be separated from each other. But they are tightened with adhesive applied, so they should not be disassembled unless required.

-**Holding check valve and related parts**.

Remove the plug and take out the spring. The poppet can come out only by slanting the casing, and if not, remove it with pliers.

-**Unloading valve(1): compensator**

Remove the plugs from both sides and take out the spring and spool.

-**Unloading valve(2)**

Remove the plugs from both sides and take out the spring and spool.

Note:

The spool and stopper bolt are tightened with each other with adhesive applied to their threads, so they should not be separated unless required. by removing the stopper bolt, the poppet and spring can be taken out of the spool.

-Pilot spool and related parts.

Remove the plugs from both sides and take out the spring and push rod.

The pilot spool set can be pushed out from the push rod side with the top of bolt.

Note:

The spool and sleeve cannot be separated from each other.

4) Reassembly

-Inspection of the disassembled parts.

Place all the disassembled parts side by side on a clean surface. Check o-rings for damage and replace defective ones. Inspect the friction surfaces of the spools, poppet and casing for flaws like scratches. Correct slight flaw with an oil stone and wash corrected parts in a cleanser.

-Main spool and related parts.

When the head is disassembled, it should be tighten and locked securely using adhesive.

Before retaining the spool, make sure that the spool slides smoothing within the casing.

-Holding check valve and related parts

Put the poppet into hole as shown in the figure and make sure that the poppet slides smoothly. Then put the spring in and tighten the plug, on which the O-ring must be installed, to the specified torque.

-unloading valve(1) and related parts.

Install the spool into hole in the correct direction. Put the spring in and tighten the plug to the specified torque.

-Unloading valve(2) and related parts.

Install the spool and confirm that the returns smoothly by the spring force after it is compressed by pushing the stopper bolt end and check that it slides smoothly.

-Pilot spool and related parts.

Be careful not to damage the O-ring during pilot spool installation. After assembly, make sure that the spool slides smoothly by pushing the push rod.

2.FLOW-DIVIDER(PTO solenoid valve)

2.1 GENERAL DESCRIPTION

This valve is installed to bypass working fluid of a specified pressure from the main circuit into the PTO circuit through a fixed orifice. It includes a changeover valve for engaging and disengage the PTO clutch by means of a solenoid and a sequential valve for PTO circuit's over the main circuit.

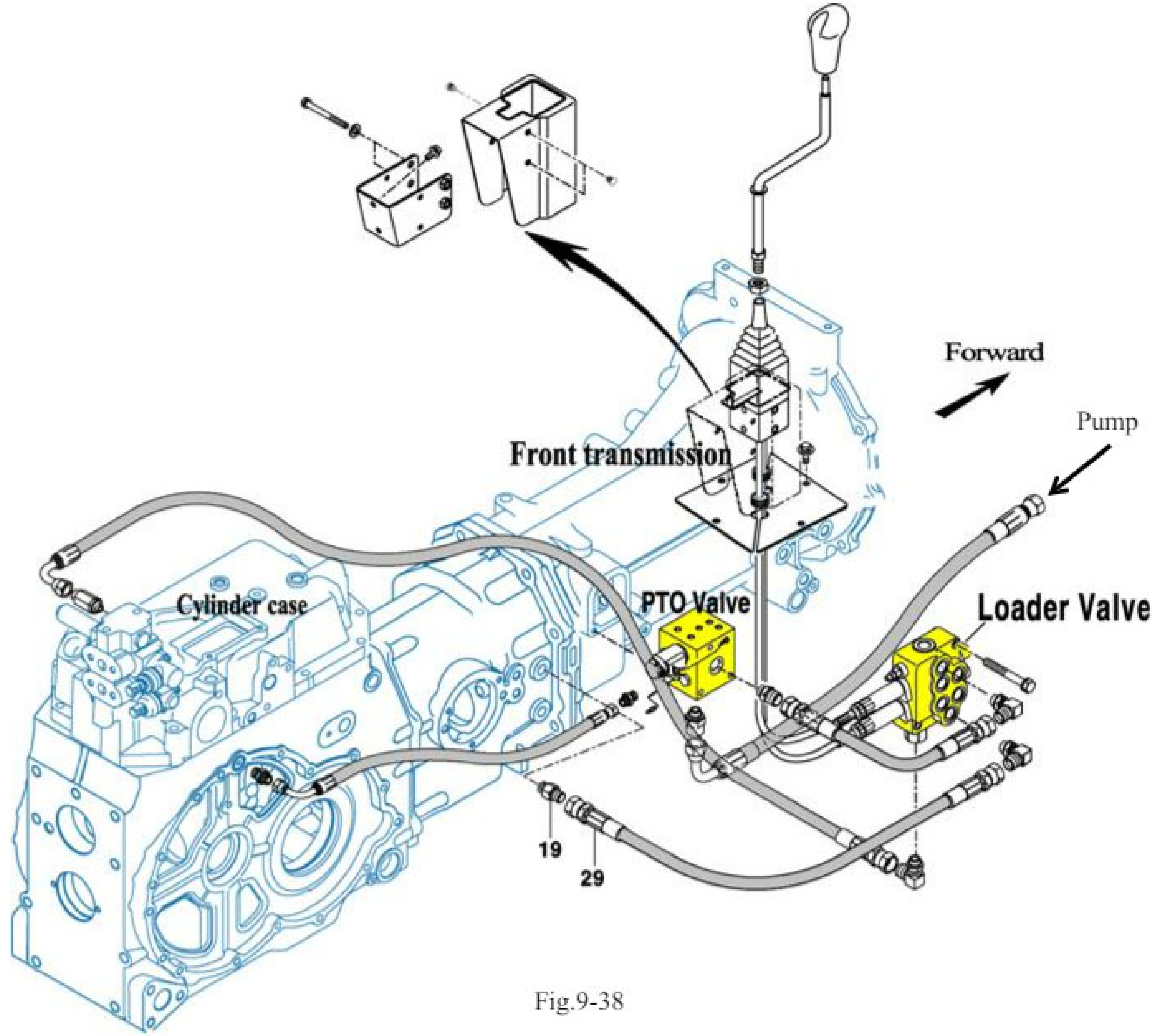


Fig.9-38

(1)Solenoid

This solenoid is switched on or off by operating the PTO switch. With this lever operation, the solenoid shifts the changeover valve to the left or the right to bypass or block the flow to port B.

(2)PTO changeover valve

This valve is composed of the spool and spring. When the solenoid is switched on, the spool is moved to the left by overcoming the spring force and allows the fluid from the pump to flow from port P to port B through the fixed orifice.

-When the solenoid is switched 「ON」

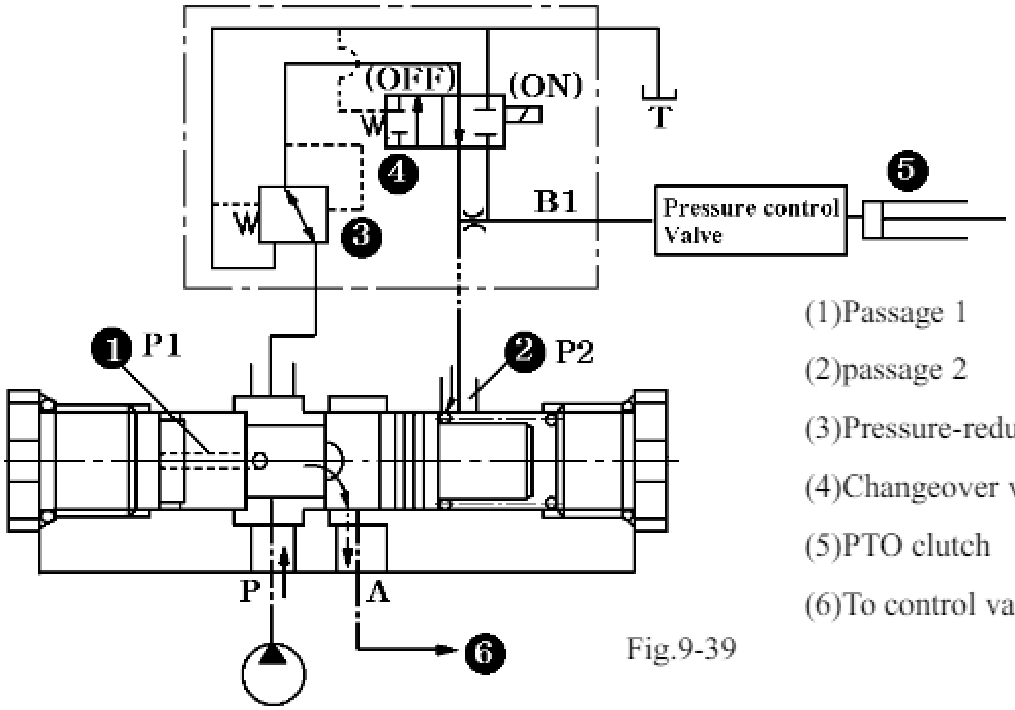
The fluid from the pump flows to port B through port P, the pressure-reducing valve, and the changeover valve.

The pressure of the PTO clutch circuit and that of passage(2) are the same and will be set as P_2.The pressurized fluid acts on the left-hand side of the valve, passing through port ; its pressure will be set as P_1.

As passage (1) and passage (2) are interconnected, then P_1=P_2.

The force imposed upon the left-hand side of the valve is P1 whereas the force imposed upon the right side of the valve is P1 plus the spring force. Consequently the spool is pushed leftwards.

Here port A is blocked, so the fluid from the pump is branched off to the PTO clutch.



(1)Passage 1

(2)passage 2

(3)Pressure-reducing valve

(4)Changeover valve

(5)PTO clutch

(6)To control valve.

Fig.9-39

-When the solenoid is switched 「OFF」:

The fluid in the PTO clutch is unloaded to the bank through port B. Consequently pressure P2 at passage(2) becomes zero, whereas the pressure at passage (1) is P1.Then the force imposed upon the left side of spool (P1)overcomes the force imposed upon the right side (P2+spring force), so that the spool is pushed rightwards to connect port P and part A. Therefore no fluid from the pump is branched off to the PTO clutch; that is, all fluid flows to the control valve.

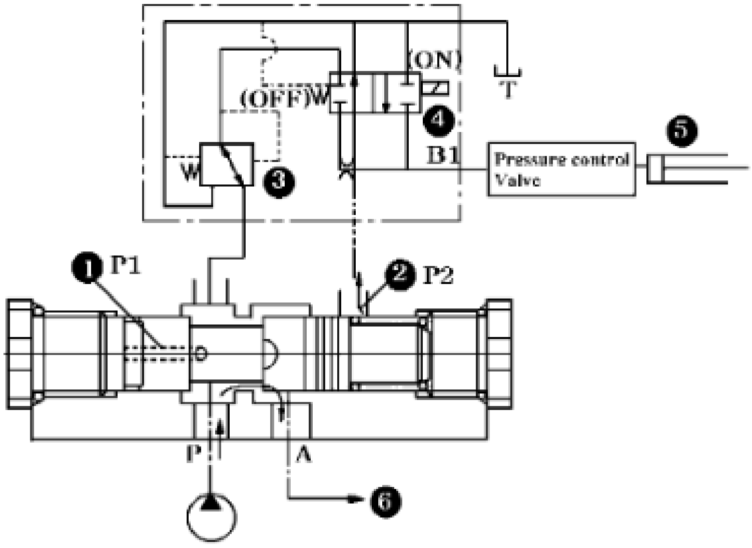


Fig. 9-40 PTO solenoid switch 「OFF」position

3. PRESSURE CONTROL VALVE

3.1. GENERAL DESCRIPTION

This valve is composed of the body, plunger, piston, springs, and plug. It serves to absorb shocks which are given when the PTO clutch engages.

3.2. OPERATIONS

1) When the clutch cylinder is achieved:

When the PTO clutch valve is turned on, the cylinder is activated. Consequently the pressure in circuit does not leave the seat of body(4) because the preset force by spring(8) and spring(9) is larger. Therefore there is no flow of fluid from port B to port T, which means all the fluid from the PTO clutch leads to the clutch cylinder.

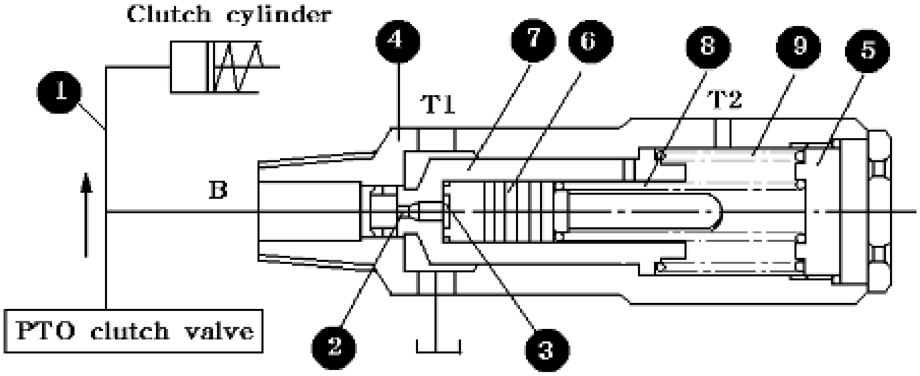


Fig.9-41 When the clutch stars engaging

No	Part name	Q'ty
4	Body	1
5	Plug	1
6	Piston	1
7	Plunger	1
8	Spring1	1
9	Spring2	1

2) When the clutch is in half-engaged state:

When the clutch cylinder is completely activated, the pressure in circuit(1) starts rising at point P1 on the graph in Fig.9-43. When the pressure reaches point P2, the piston starts moving to the right overcoming the force of spring(6 and 7).
Here the flow through chock(2) causes some difference in pressure between circuit (1) and chamber (3) . As the effective area of the seat of plunger(7) for circuit(1) pressure and that for chamber(3) pressure are the same, this pressure difference causes the plunger to compress spring(9) to move to the right, which opens the passage from port B to port T1 to prevent the pressure in circuit from rising abruptly. As piston(6) moves to the right, the force of spring(8) increases so much.
Both pressures in chamber(3) and circuit(1) also increases gradually, so the clutch engages smoothly without shocks.

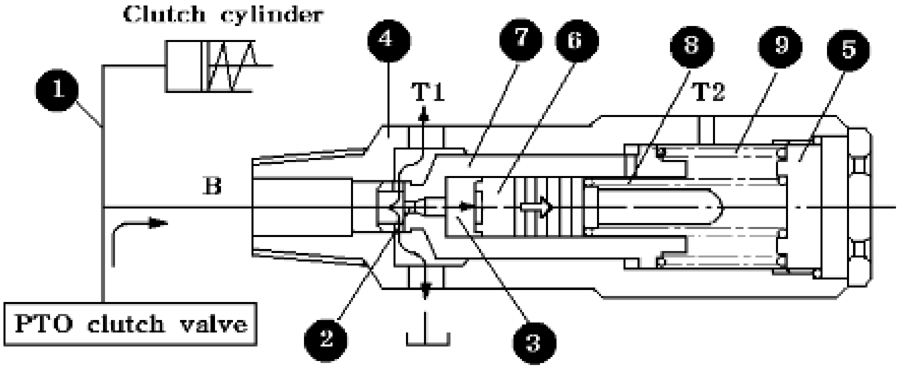


Fig.9-42 When the clutch is in half-engaged state

Dynamic characteristics

Provided P1=3Kgf/㎠(43psi)

P2=3.6 Kgf/㎠(51psi)

P3=5.9 Kgf/㎠(84psi)

T=0.4-0.6 sec

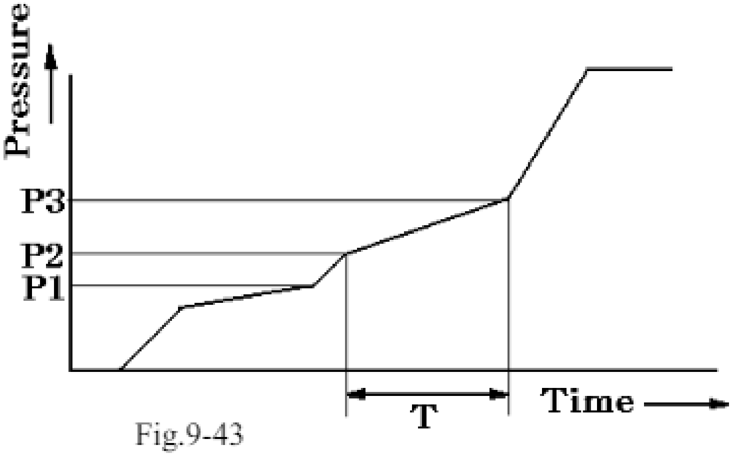


Fig.9-43

2) When the clutch is engaged completely

When the piston(6) moves to the end, there is no flow through chock(2) and the pressures in chamber (3) and circuit(1) become equal, that is, the pressure which the plunger receives on both sides are the same.Consequently,plunger(7) is pushed back to the left by the force of spring(9),which closes the passage from port B to port T. With this, the pressure in circuit(1) starts rising at point P3 up to the supplied pressure. Thus the clutch engagement is maintained.

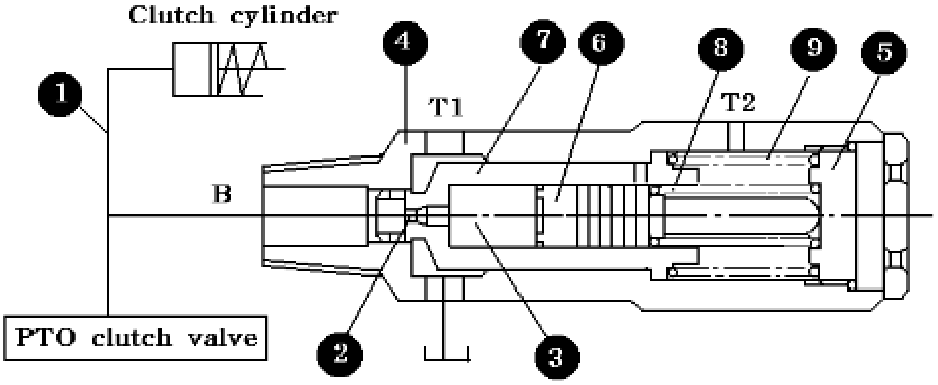


Fig.9-44 When the clutch is completely engaged

3.3 DISASSEMBLY AND INSPECTION

1) Required Tools
- -24 mm box type wrench and torque wrench: for valve tightening
- -22 mm box type wrench and torque wrench: for plug(5)
- -Other required things: tweezers, sealing tape, rag, and oil stone

2) Disassembly

a. Detach the change cover and remove this valve assembly

b. Remove the plug(5) ,Take springs (9 and 8), and then extract piston(6) and plunger(7) by tilting body(4).

3) Inspection of the disassemble parts.

Inspect the plunger and the piston for dents on their friction surfaces. Such flaws must be corrected with oil stone. Wash all parts in fresh cleansing oil

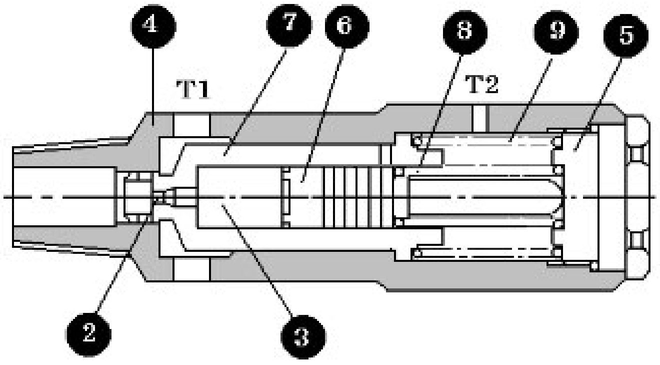
4) Reassembly

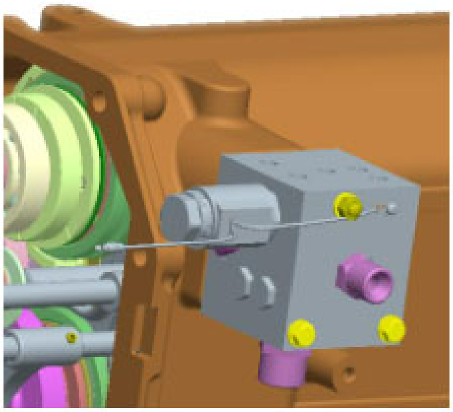
a. Tightening torque

Ref. No	Fastener Name	Tightening torque [Kgf.m(ft.lbs)]
(5)	Plug	4.0-5.0(28.9-36.2)
	Valve assembly*	4.5(32.6)

*** The threads should not be wrapped with sealing tape.**

b. Install plunger(7) into body(4) and confirm that the plunger moves smoothly. Then install piston(6),spring(8),and spring(9) in order and tighten plug(5) to the specified torque.





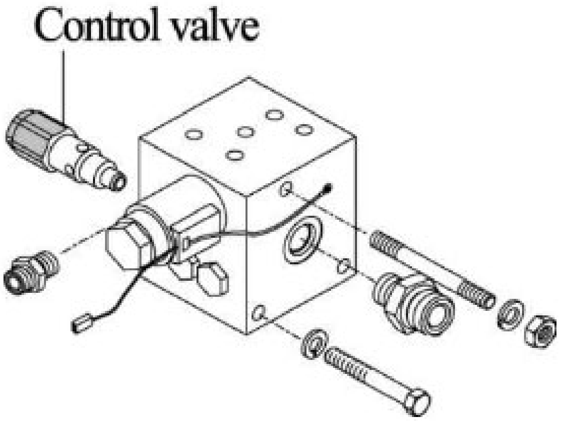
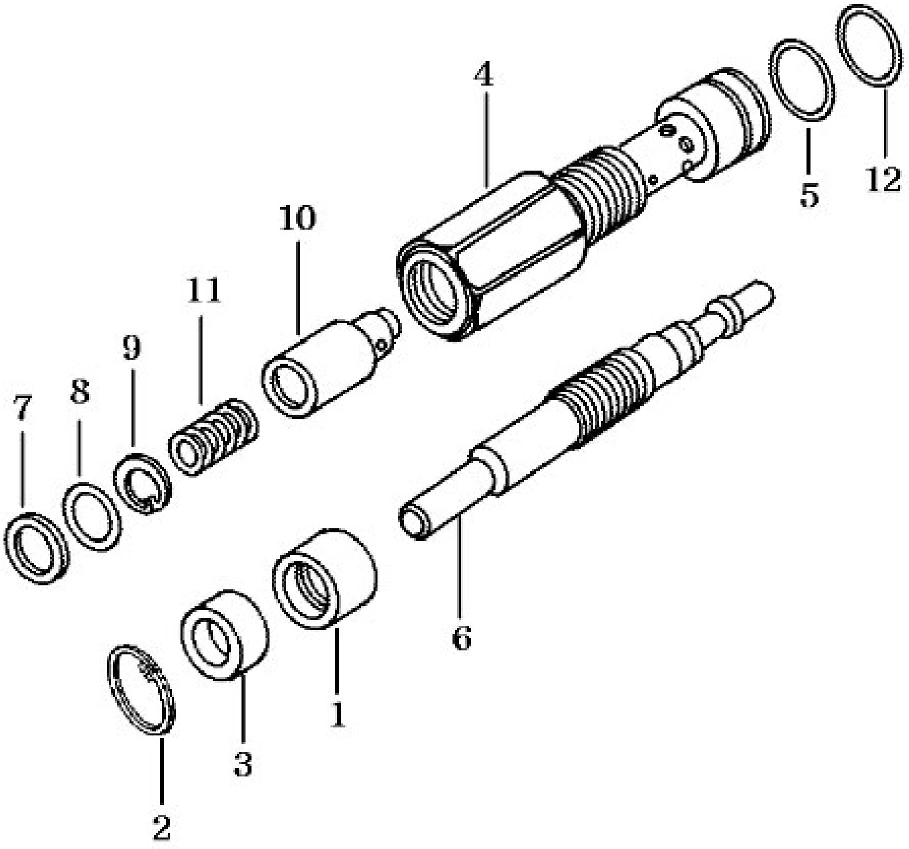


Fig.9-45

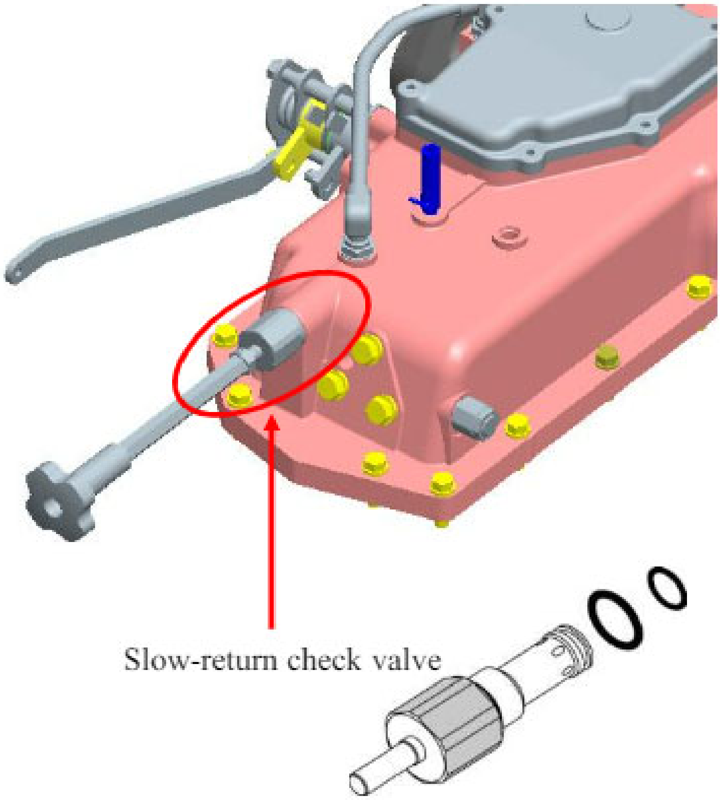
4. FLOW-CONTROL VALVE(SLOW-RETURN CHECK VALVE)

4.1. GENERAL DESCRIPTION

This valve regulates the lowering speed of the lift by controlling the unloading flow from the lift cylinder to the tank.



①Dust seal
②Snap ring
③Collar
④Body
⑤0-ring
⑥Adjust screw
⑦Back-up ring
⑧0-ring
⑨Stop ring
⑩Poppet
⑪Spring
⑫0-ring



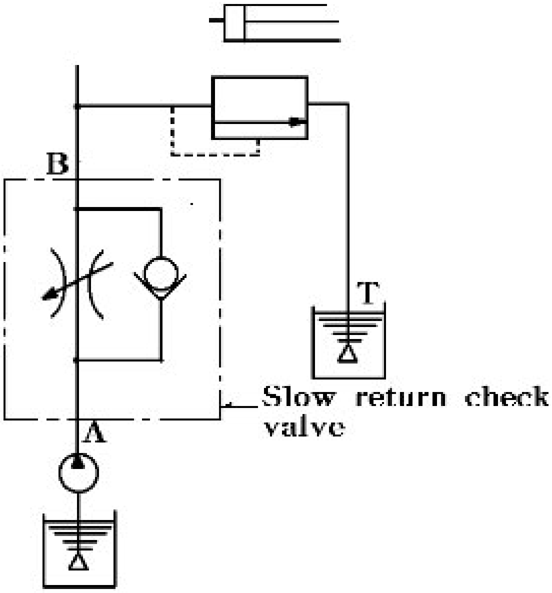


Fig. 9-46 Slow-return check valve Diagram

4.2 OPERATIONS

1) DOWN position

The fluid from port B pushes up stop ring (9) of poppet(10) until the ring comes into contact with adjust screw(6),as it reaches chamber (R). Consequently, the extent choke (C) is opened is determined by the positioning of adjust screw (6):that is, when adjust screw(6) is screwed in clockwise, the opening of chock (C) decreases and the lowering speed of the lift arm slows down; whereas the opening of choke (C) increases and the lowering speed of the lift is accelerated when the adjust screw is unscrewed counter clockwise. When the adjust screw screwed in completely, the poppet comes into contact with body seat (S) and the choke is closed completely, so the lift arm stops.

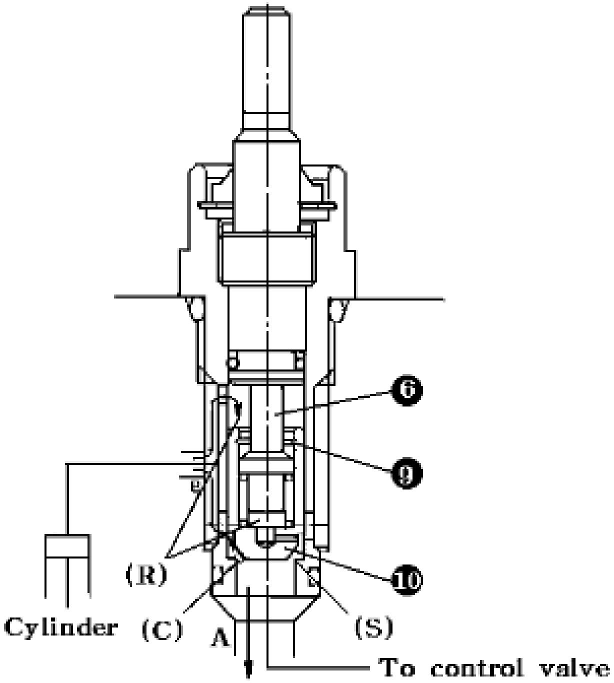


Fig. 9-47 Down position

2) Up position

The flow port A, overcoming the force of spring(11),pushes up poppet (10) and choke (C) is fully opened regardless of the position of adjust screw(6).Thus the fluid flows to port B and the cylinder, which results in raising the lift arm.

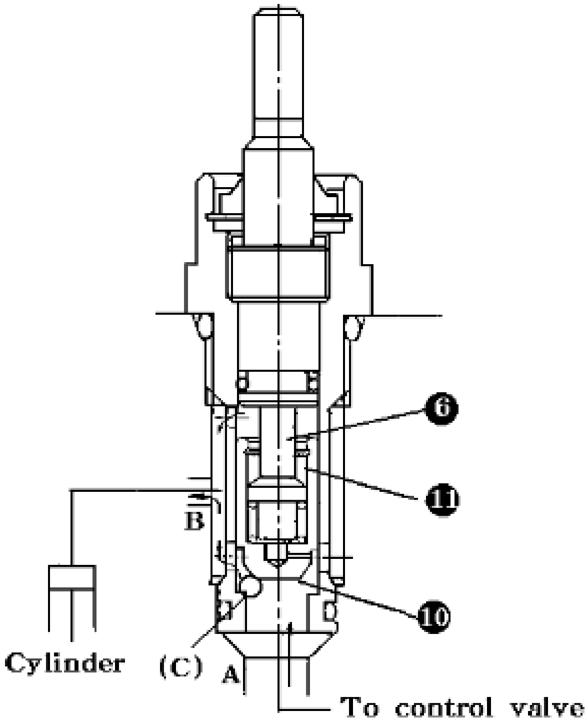


Fig. 9-48 Up position

5.SAFETY VALVE

5.1 GENERAL DESCRIPTION

With the chock closed completely by turning the adjust screw tightly clockwise, the implement mounted on the lift is held at a specified height. While the tractor is traveling on roads in the condition, there is a possibility that the cylinder pressure will rise excessively when the implement bounces. In such a situation the cylinder pressure can rise so high as to break the cylinder. To prevent such an accident, the relief valve works to leak off the fluid in the cylinder to the tank via port P and port T to decrease the cylinder pressure

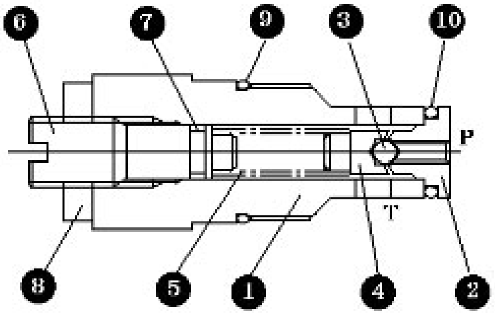


Fig.9-49

1.Body 2.seal 3.Ball 4.Spring seat
5. Spring 6.Adjust screw 7.O-ring
8.Lock nut 9.O-ring 10.O-ring

Circuit diagram

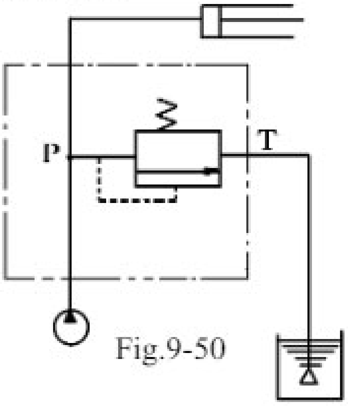
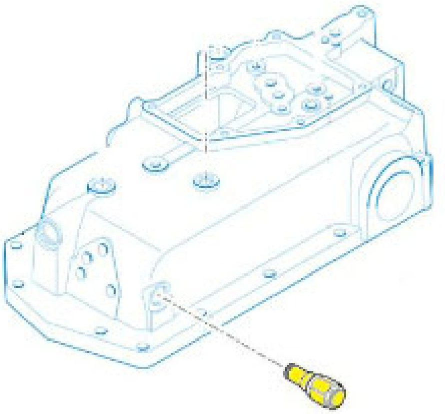


Fig.9-50



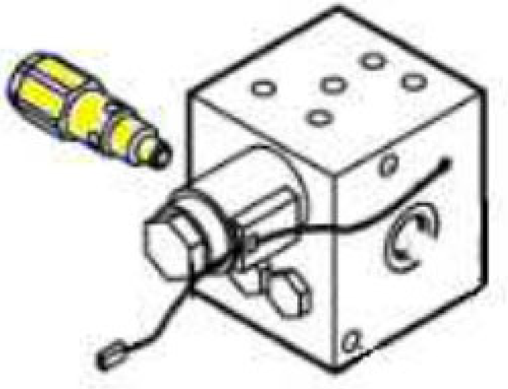
5.2 OPERATION

This valve is installed in the slow return check valve circuit and able to be installed in the cylinder case instead of Bolt. When the adjust screw of the slow return check valve is closed completely, the slow return check valve is completely closed. In this condition, when the cylinder pressure exceeds the regulated pressure of the relief valve: cracking pressure, the fluid pushed up ball(3),overcoming the force of spring(5).Then the surplus fluid is bled off to the tank via port P and Port T.

6. RELIEF VALVE

1) GENERAL DESCRIPTION

This valve regulates the maximum pressure in the whole hydraulic circuit. The regulated pressure can be set with the adjust screw.



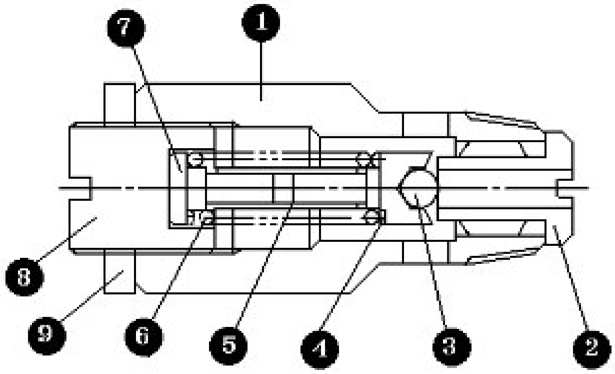


Fig.9-51 Relief valve

1.Body 2.seal 3.Ball 4.Spring seat
5. Sleeve 6.Spring 7.Spring stopper
8.Adjust screw 9.Lock nut

2) PRECAUTIONS FOR DISASSEMBLY AND REASSEMBLY

(1)Tightening torque of lock nut (9)5.0~6.0 kgf·㎠(36.2~43.4 ft.lbs)

(2)Install seat(2)and then tap ball(3)(5/16) lightly so as to provide tight seating.

(3)Wrap the valve threads with sealing tape and tighten the valve up to a specified torque of 5-6Kgf.m(36-43 ft.lbs)

(4)Before disassembly, the current screwing-in depth of the adjust screw should be written down or memorized for later reference.

3) MEASUREMENT OF THE RELIEF PRESSURE

(1) 3 POINT TO TEST RELIEF PRESSURE

①Remove the plug on the rear side of the transmission case and install a compression gauge to measure the pressure.

Keep the engine speed at 2600 rpm and shift the position control lever at the highest position.

②Control valve coupler.

③Remove the plug in the hyd. pump flange and engage the pressure gauge and measure it.

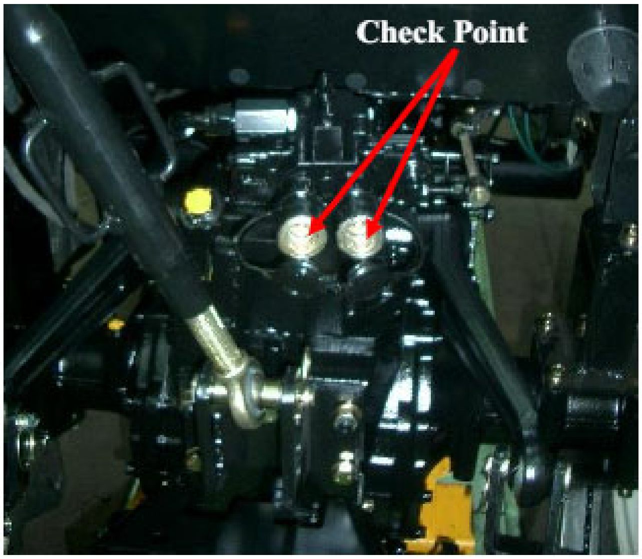


Fig.9-52

Measurement the Pressure must be done 3 times and should be set within specified pressure.

Specified relief pressure	170 +5 kgf·㎠ At 40 L/min, Oil 50°C

7.GEAR PUMP

7.1 GENERAL DESCRIPTION

This pump induces fluid from one side and delivers it from the other side, by rotating two gears meshed with each other. The actual delivery is as mentioned below, considering the consequences of fluid temperature and volume efficiency in accordance with revolution speed. That is dual pump system.

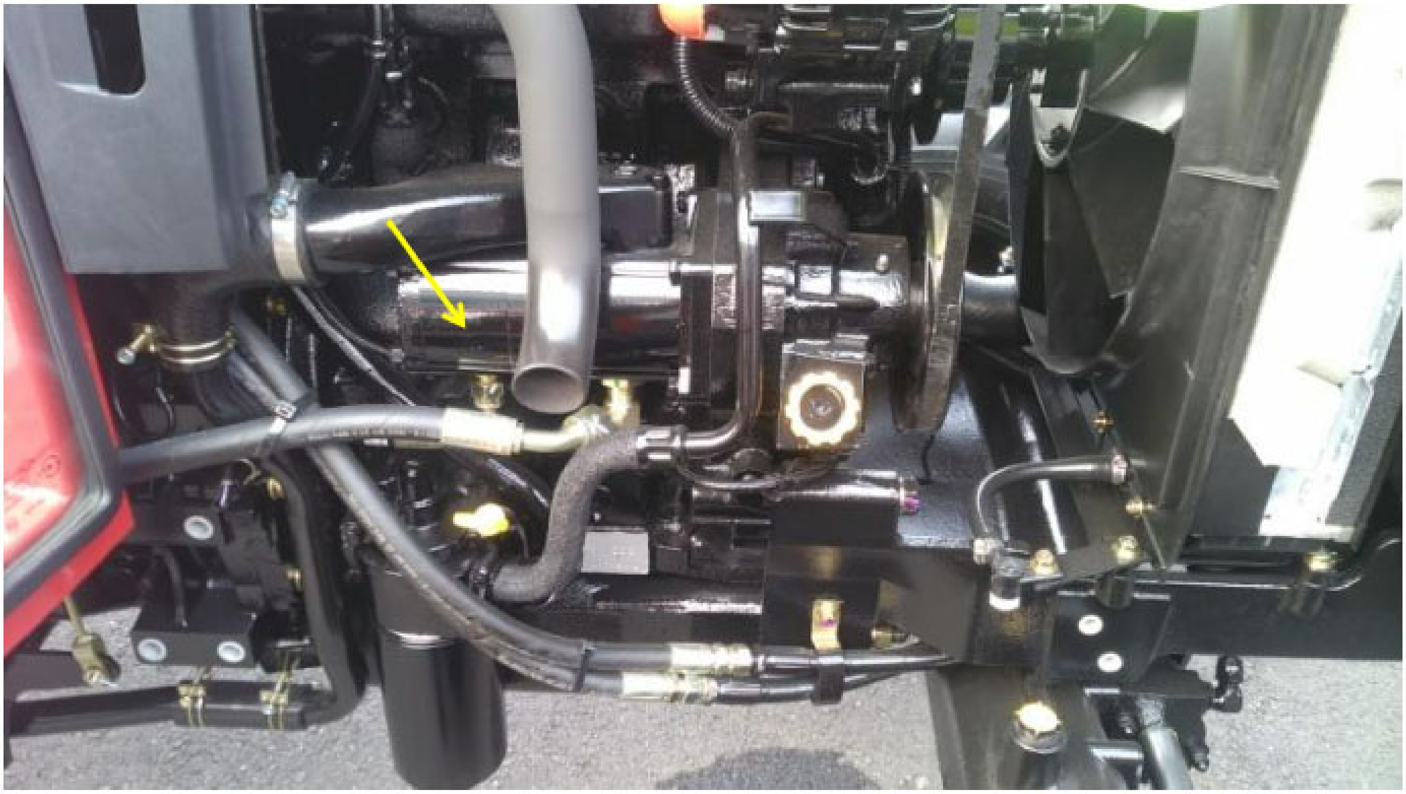
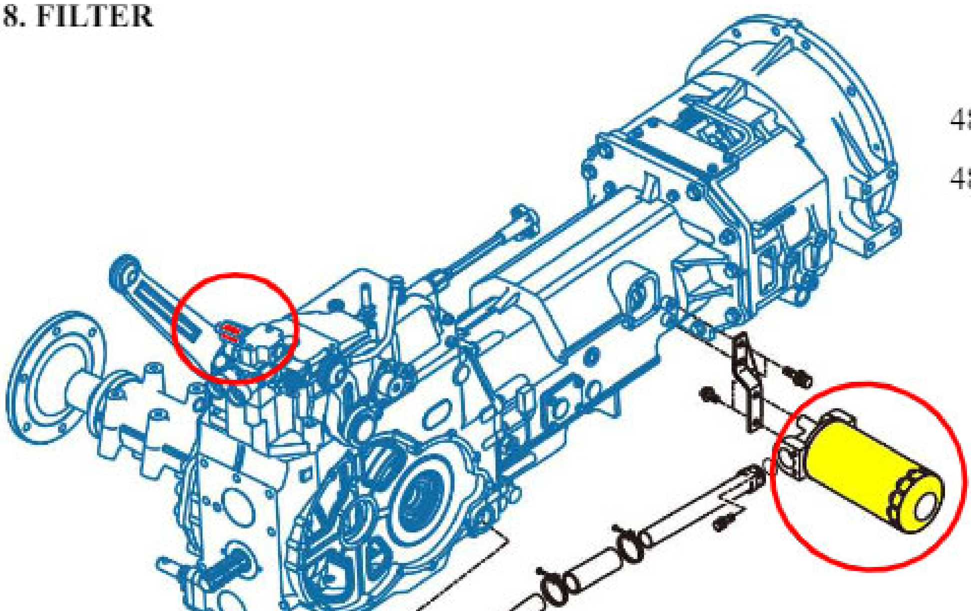


Fig. 9-53 Gear pump

8. FILTER



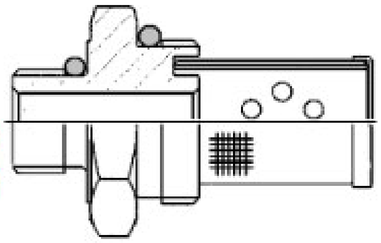
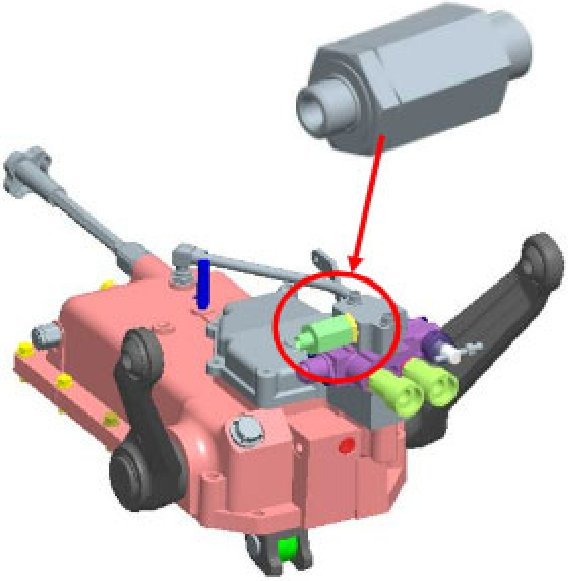


Fig. 9-54 Filter



8.1 GENERAL DESCRIPTION

The tractor is equipped with two oil filters: suction filter(48) and line filter(4), for better filtration.

8.2 SPECIFICATIONS

1)Suction filter

Model	2655 HST
Applicable oil	DONAX TD or RPM THF 500
Rated flow rate(ℓ/min.)	43
Filtration density	150 mesh
Filtration area	6231㎠
Working oil temperature (℃)	-30 ~90℃

2) Line filter

Rated flow((ℓ/min.)	35
Filtration density (mesh)	100 mesh

8.3 REPLACEMENT

Check the O-rings for damage or deformation and replace defective ones. When installing the filters, be sure to install the O-rings properly with grease applied.

SECTION 5. REMOTE HYDRAULIC CONTROL

1.GENERAL DESCRIPTION

- A hydraulic operated implement can be driven and controlled with this optional remote hydraulic control valve set.
- The valve is connected between the gear pump and the main control valve and is given a priority to draw hydraulic power.
- The valve is installed on the right-hand side of the hydraulic cylinder case and the connecting ports are provided under the right hand step .

2.FUNCTIONS

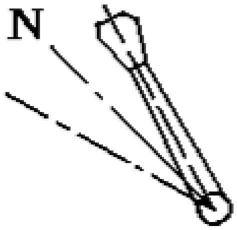
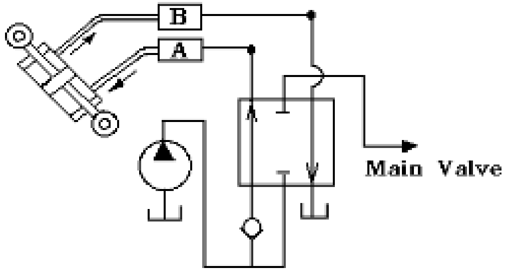
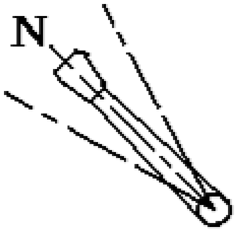
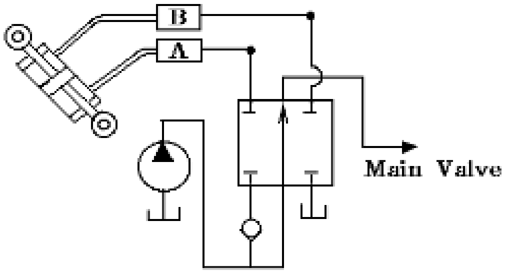
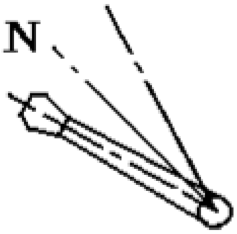
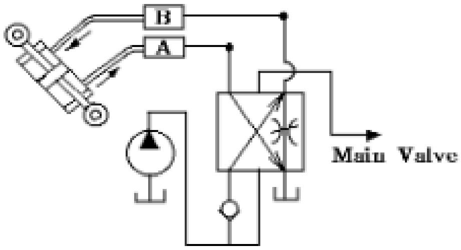
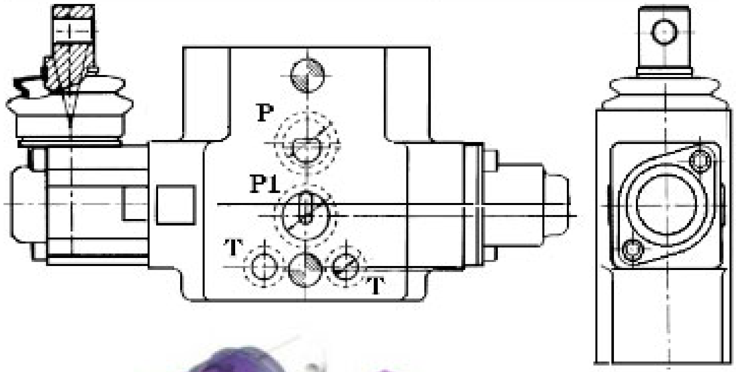
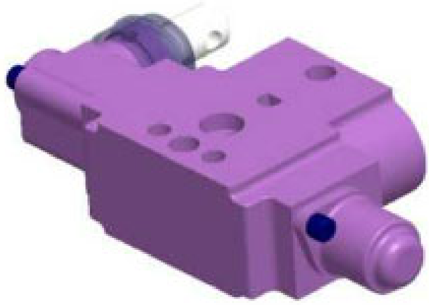
Lever position		Circuit diagram
 Lifting	Lifting A to B	
 Neutral	Neutral Closed at A and B	
 Lowering	Lowering B to A	

Fig. 9-55 Remote hydraulic pump

3. SPECIFICATIONS

Maximum flow (ℓ/min)	45 LPM
Maximum pressure (Kgf/㎠)	210
A and B port leak Oil temperature:50℃(122℉) Under a load of 100Kgf/㎠	9 cc/min below
Recommended fluid	THF 500
Operating temperature range	-20℃~90℃





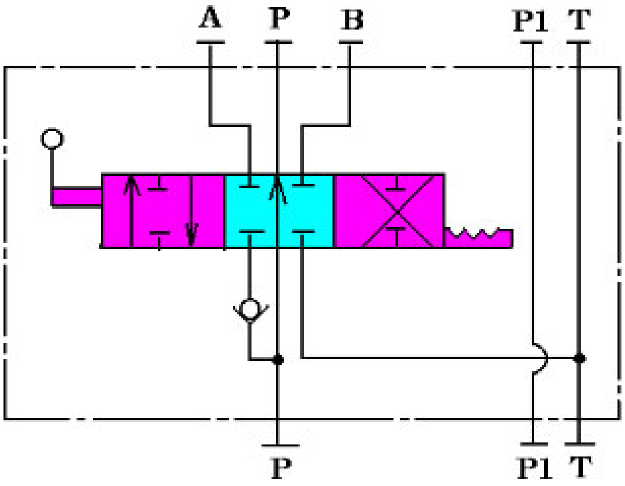
Detent function

Fig. 9-56

Floating / Detent circuit (If equipped)

Fig. 9-57

3.1 HYDRAULIC CIRCUIT

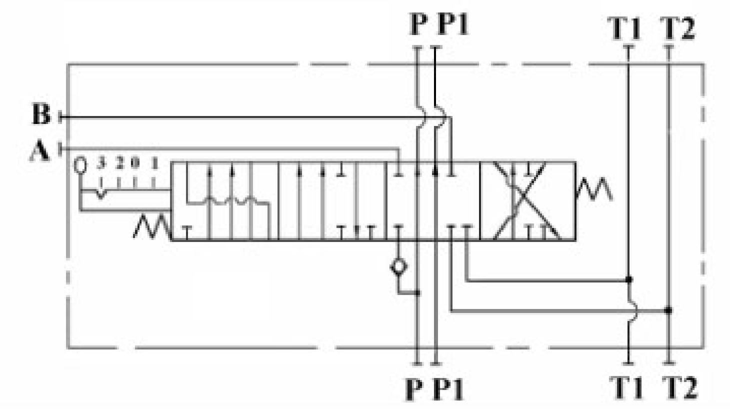


Hydraulic circuit (Spring type)

P: From pump

T: To tank

A, B : High pressure port, Return port



Floating / Detent circuit (If equipped)

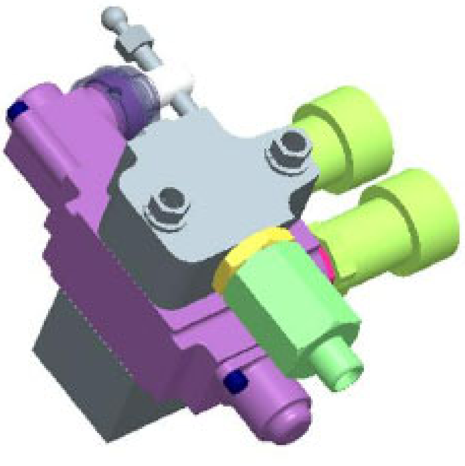


Fig. 9-58 hydraulic circuit

Problems	Causes	Countermeasures
1.Lift does not rise	1)Insufficient engine speed	Raise engine speed slightly
	2)Insufficient transmission oil	Maintain oil level by replenishing with the same kind of oil
	3)Air taken in through suction	Tighten securely or replace broken parts.
	4)Clogged suction filter	Clean.
	5)Broken or poor hydraulic pump	Inspection pump and repair or replace if necessary. Pay particular attention to shaft seal because a broken seal sometimes intakes air.
	6)Poor link mechanism	Inspect, adjust, repair, or replace if necessary. (Refer to section 3)
	7)Excessive load on lift	Decrease load
	8)Broken cylinder	Replace
	9)Too low viscosity of transmission oil	As it will cause oil leaks or internal wear, replace with gear oil of SAE80
	10)Maladjusted relief valve	Readjust. (Cracking: refer to the specifications)
	11)Excessive internal leaks	Inspect cylinder and valves. Replace damaged seals, and repair. (Check each part systematically)
	12)Broken flow divider (Stuck sequential valve spool)	Disassemble and wash spool clean. If it is damaged seriously, replace it as an assembly. If damage is minor, correct surface with oil stone and finish by lapping.
	13)Broken control valve (Even when spool is shifted to up position, lift does not rise)	
	①Stuck compensator plunger (unloading valve 1)	Lap after repairing flaws with oil stone
	②Clogged orifices or slanted orifices in pilot passage.	Clean them with compressed air or a sharp point.
	③Stuck poppet (unloading valve 2)	Correct minor flaws with oil stone
	④Bitten or stuck check valve plunger	Lap after repairing flaws with oil stone
	14)Broken slow-return check valve	
	①Stuck poppet	Lap after disassembling, cleaning, and repairing flaws with oil stone

Problems	Causes	Countermeasures
2.Too low rising speed of lift	1)Above causes can also be possible	Repair according to above instructions.
	2)Too small a spool stroke in control valve	Inspect, readjust, or replace link mechanism if necessary.
	3)Broken compensator spring (unloading valve 1) in control valve	Replace spring.
	4)Stuck poppet (unloading valve 2)	Correct minor flaws with an oil stone
3.Lift lowers even when adjust knob is closed fully with adjust Handle (While engine is stopped)	1)Stuck poppet	Lap after disassembling, cleaning, repairing flaws with oil stone
	2)Poor valve seat	Replace valve
	3)Poor 0-ring	Replace
4.Lift does not lower	1)Slow-return-check valve knob is turned to the lock position	Turn knob to fast position
	2)Stuck poppet of slow-Return-check valve	Lap after disassembling, cleaning, repairing flaws with oil stone
	3)Seized lift shaft	Apply grease and repair or replace bushings or shaft if necessary.
	4)Stuck main spool	Lap lightly after disassembling, cleaning, and repairing flaws with oil stone or replace as an assembly.
5.Too slow lift lowering speed	1)Above mentioned causes can also be possible.	Repair or adjust according to instructions mentioned above.
	2)Insufficiently lowered control lever	Lower lever sufficiently
	3)Excessively closed slow-return check valve	Open valve sufficiently
6.When hydraulic control lever is raised, relief valve beeps.	1)Maladjusted lever stopper check valve	Readjust lever stopper guide position
	2)Poor link mechanism	Inspect, readjust, repair, or replace link mechanism if necessary.
7.Fluid overheating	1)Excessively high working pressure	Inspect and adjust
	2)Too high or low viscosity of working fluid.	Replace with fluid of adequate viscosity.
	3)Insufficient fluid	Maintain specified level by replenishing

Problems	Causes	Countermeasures
8.Pump noise	1) Partially clogged suction filter or suction piping.	Clean.
	2) Air inhaled through suction piping and intake pipe connections for pump	Inspect and retighten.
	3) Loosened pump cover tightening bolts.	Inspect and retighten
	4) Too rich oil viscosity	Replace with fluid of adequate viscosity.
	5) Broken or worn pump parts	Inspect and replace defective parts.
9.Excessive wear, deflection or damage of pump	1) Dirty fluid	Eliminate foreign matter and inspect filters.
	2) Circuit pressure exceeds pump capacity	Adjust relief valve or replace if necessary
	3) Oil-less operation due to Insufficient oil quantity	Inspect transmission oil level and maintain specified oil level by replenishing. In either case, clean, and repair pump parts and replace damaged ones if necessary.
10.Oil leaks outside pump	Broken or fatigues oil seal or O-ring	Replace
11.Oil leaks from piping or joints	Poorly connected piping	Inspect, clean, and eliminate dust. Repair flaws with oil stone if necessary. Retighten.
	Poor O-ring	Replace
	Broken piping	Replace with a new one after washing clean related parts.
12.Oil leaks around lift arm	Poor oil seals	Replace oil seal or bushing if necessary
13.Independent PTO clutch slips or is too slow in engaging	1) Clogged fixed orifice of Flow divider	Disassemble and wash clean.
	2) Port B regulated pressure is too slow	Inspect and reset pressure
	3) Clogged PTO pressure control valve or stuck	Disassemble and wash clean. Repair flaws with oil stone if necessary or replace with a new one.
	4) Poor flow divider solenoid valve	Disassemble and repair or replace with new one if necessary .

Problems	Causes	Countermeasures
14.Independent PTO clutch is too quick in engaging	1) Stuck pressure-reducing valve spool	Lap after correcting flaws with oil stone
	2) Fatigued or broken pressure-reducing valve spring	Replace.
	3) Worn or broken sealing of PTO clutch	Replace
	4) Worn friction plates or driven plates	Replace
	5) Overheated fluid	Refer to paragraph for "fluid overheating"
	6) Port B regulated pressure is too high of Flow-divider	Inspect and reset pressure
	7) Stuck pressure-reducing valve spool	Lap after correcting flaws with oil stone
	8) Clogged orifice in pressure-reducing valve spool	Clear clogged with compressed air or with a sharp point.

Chapter 10
Electrical accessory and instruments

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Chapter 10 Electrical accessory and instruments

SECTION 1. GENERAL DESCRIPTION

The basic electrical system of tractors consists of the engine cranking system , battery charging system, lighting system, meters, switches, etc.
For further information concerning the engine cranking equipment and battery charging equipment, please refer to the engine manual.
The battery is a power source to activate the engine cranking system, lighting system, and other electrical equipment. The lighting system is used to activate the illumination lights, indicators, and signal lights. The meter is a device that enables the operator to be aware of the present operating conditions; oil pressure gauge, water temperature gauge (thermometer), fuel gauge, etc. are installed.
All the controls, meters, and indicators are arranged around the operator's seat for easy Maneuverability readability, and convenience.

SECTION 2. SPECIFICATIONS

MODEL			2655 HST	
PART NAME			Specification (w)	Quantity
1.lighting system	Head lights		55/55	2
	Front combination lights	Turn signal lights	21	2
		Small lights	8	2
	Rear combination lights	Turn signal lights	21	2
		Stop lights	21	2
		Tail light	5	2
2. Monitoring system	Meter assembly	Hour meter	-	1
		Fuel gauge	-	-
		Thermometer	-	-
		Pilot light	(3.4)	15
	Horn		-	1
3.Fuses	Fuses (A)	In main fuse box (with spare fuse)	15A 10A	6 9
		In Cabin fuse box	20A	4
	Fusible links	Engine wiring	50A 60A	3 1
4.Battery			12V80AH	1

SECTION 3. BATTERY

1.INSPECTION

1.1 INSPECTION OF ELECTROLYTE LEVEL

As the battery repeats charging and discharging during operation. The water content in the electrolyte gradually evaporates, and as a result, the level should be inspected at the specific level; replenish with distilled water.

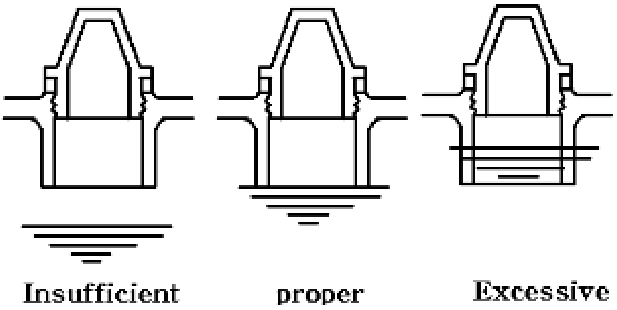


Fig.10-1 electrolyte level

1.2 INSPECTION OF ELECTROLYTE SPECIFIC GRAVITY

The specific gravity of the electrolyte lowers as the battery discharges, so the battery condition can be determined by measuring the specific gravity. The specific gravity can be measured generally with a suction type hydrometer which must be read properly as shown in Fig. 10-2

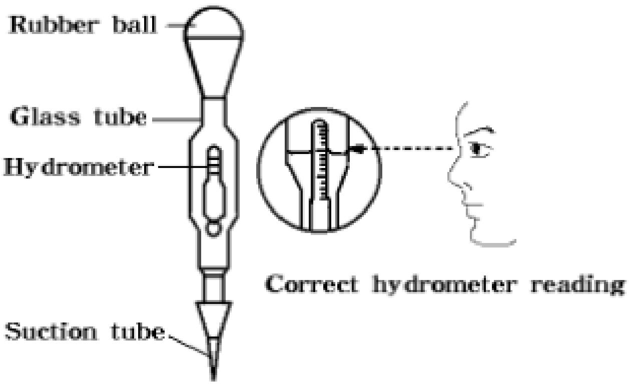


Fig.10-2 electrolyte gravity

Note:
When the distilled water is added, charge the battery to mix it well into the electrolyte before measuring the specific gravity.

a. Temperature correction of the hydrometer reading

The specific gravity of the battery electrolyte (diluted sulfuric acid) varies with the temperature of the electrolyte at a rate 0.0007 specific gravity point for each 1℃ change in temperature. Therefore, when the specific gravity of the electrolyte in the battery is measured with a suction type hydrometer, a temperature correction should be made, using the following formula to permit the direct comparison of the measured valve with the standard specific gravity at 20 ℃.

S_{20} :St+0.0007(t-20)

S_{20} :Specific gravity at standard temperature of 20 ℃.

t : Temperature of the electrolyte at the time of measurement

St : Specific gravity of the electrolyte measured at t ℃.

1.3 BATTERY CHARGING

If the specified gravity of the battery electrolyte in lower than 1.220 (at 20 ℃),the battery should be recharged, because leaving an undercharged battery without recharging it will lead to permanent battery damage. The battery is subject to self-discharge at a rate as shown in the table below. Therefore it should be recharged from time to time when storing the battery unused for a long period of time.

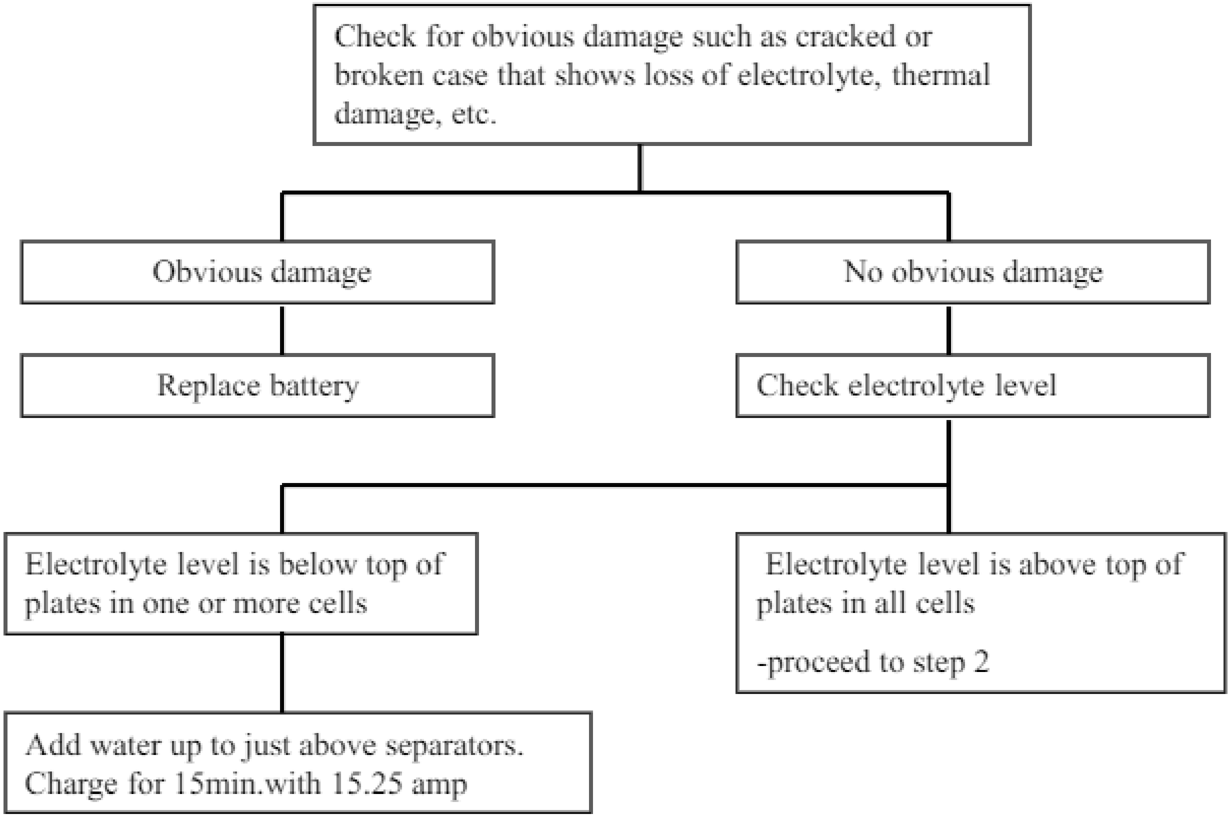
When recharging the battery, wash clean the outside of the battery case and the battery posts. Check the level of the electrolyte in each cell and replenish with distilled water as necessary.

Temperature	Self-discharge rate per day (%)	Decrease in specific gravity per day
30 ℃	1	0.002
20 ℃	0.15	0.001
5 ℃	0.025	0.005

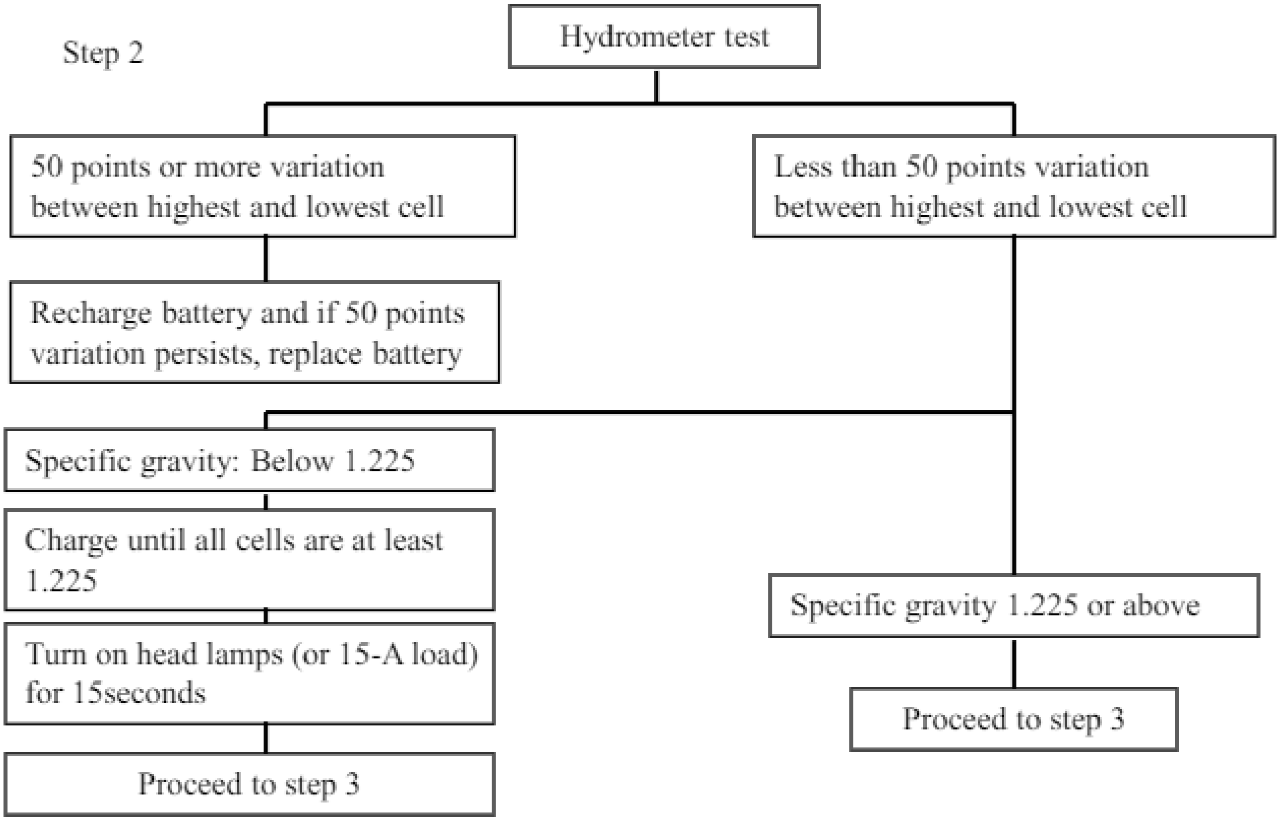
1.4 BATTERY TESTING CHARTS

Step 1.

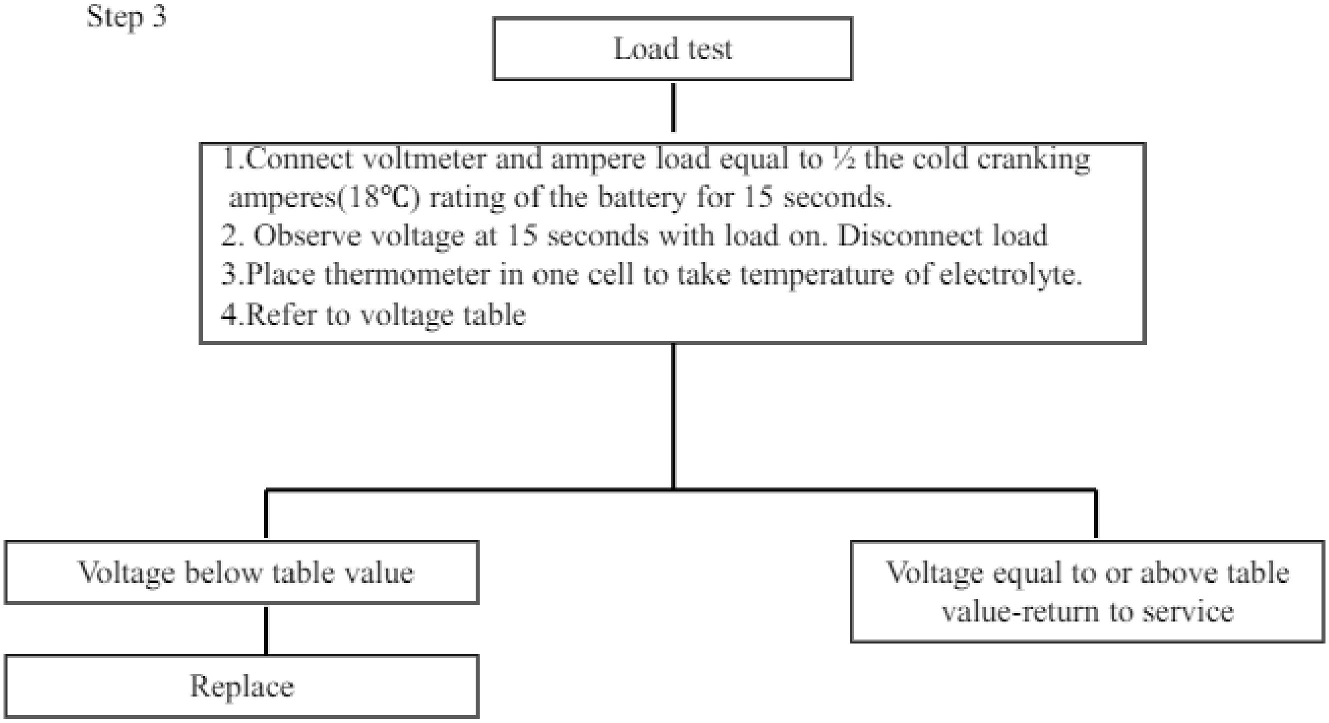
VISUAL INSPECTION


Check for obvious damage such as cracked or broken case that shows loss of electrolyte, thermal damage, etc.
Obvious damage
No obvious damage
Replace battery
Check electrolyte level
Electrolyte level is below top of plates in one or more cells
Electrolyte level is above top of plates in all cells
-proceed to step 2
Add water up to just above separators. Charge for 15min.with 15.25 amp

Step 2


Hydrometer test
50 points or more variation between highest and lowest cell
Less than 50 points variation between highest and lowest cell
Recharge battery and if 50 points variation persists, replace battery
Specific gravity: Below 1.225
Charge until all cells are at least 1.225
Turn on head lamps (or 15-A load) for 15seconds
Proceed to step 3
Specific gravity 1.225 or above
Proceed to step 3

Step 3



Load test

1.Connect voltmeter and ampere load equal to ½ the cold cranking amperes(18℃) rating of the battery for 15 seconds.
2. Observe voltage at 15 seconds with load on. Disconnect load
3.Place thermometer in one cell to take temperature of electrolyte.
4.Refer to voltage table

Voltage below table value

Replace

Voltage equal to or above table value-return to service

Voltage table	
Estimated electrolyte temperature	Minimum required voltage under 15 sec. load (Use ½ these values for 6-V batteries)
70 ℉ (21 ℃) and above	9.6
60 ℉ (16 ℃)	9.5
50 ℉ (10 ℃)	9.4
40 ℉ (4 ℃)	9.3
30 ℉ (-1 ℃)	9.1
20 ℉ (-7 ℃)	8.9
10 ℉ (-12 ℃)	8.7
0 ℉ (-18 ℃)	8.3

SECTION 4. METERS AND SWITCHES

그림변경

1.METERS

1.1 Removal

a. Disconnect the cable from the negative post.

b. Remove the screw which hold the cover of meter panel and lift up the cover assembly a little. Pull the meter panel out after removing the screws.

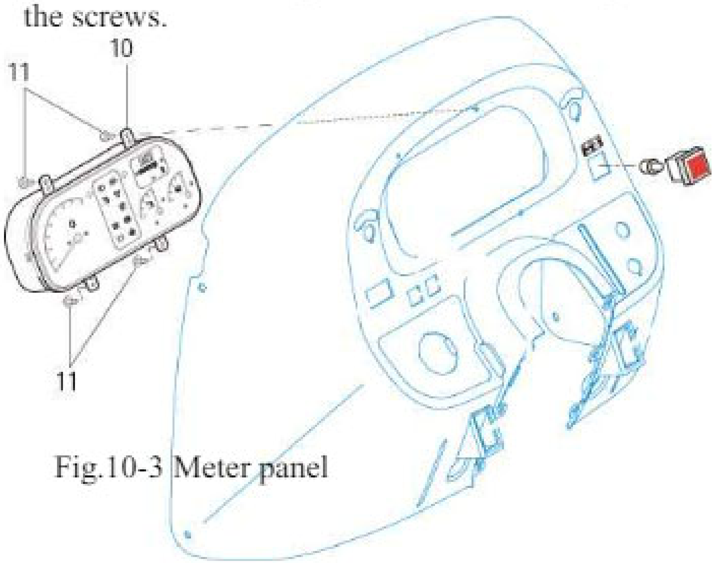


Fig.10-3 Meter panel

c. Then the meter panel can be detached by removing the wire harness couplings.

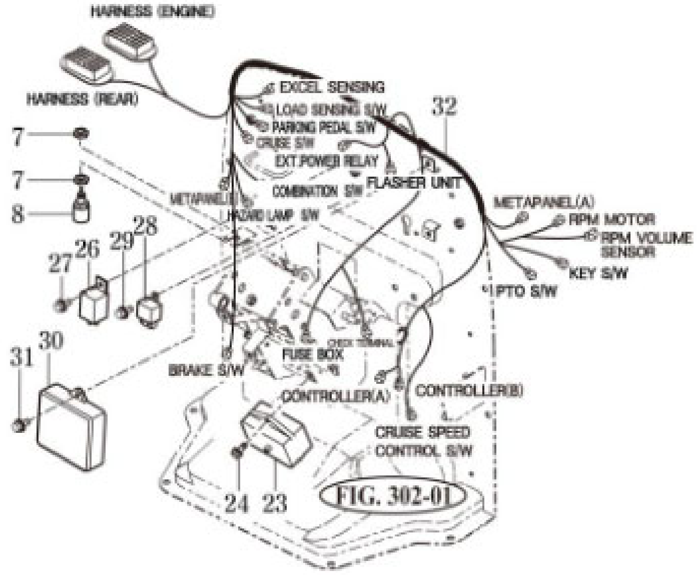


Fig.10-4 Wire harness

1.2 Tacho/hour meter and sensor

a. Construction

An electric tachometer is employed along with a Tachosensor. The tach/hour meter converts engine revolutions to electric signals, which is sent to the tachometer. The tachometer displays the engine revolutions visually. The tachosensor generates 10 pulses per one engine revolution. The generated pulses are converted into voltage output through a converter. Then the voltage is divided into three different phase coils through a IC circuit. The tachometer pointer is swung by the compound magnetic field generated by the three point.

b. Inspection

-Tachometer

The allowable error of a tachometer reading is specified as shown on the table below. If the reading deviates from the specified value. replace the meter assembly.

Engine speed (rpm)	1000	2500
Allowable error (rpm)	±150	±150

1.3 Fuel gauge and Fuel gauge sensor

a. Construction

When the fuel tank is full, the float is at the top and has moved the variable resister to a position of least resistance. This feeds maximum current into the meter circuit and the pointer swings fully to the F position. Consequently when the fuel level in the tank is low, everything acts in reverse.

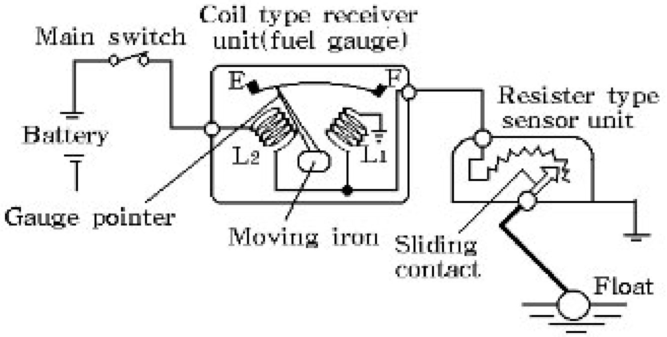


Fig.10-5 Fuel gauge sensor

b. Inspection

-Fuel meter

Connect the fuel gauge to form a circuit with the resisters as shown Fig.10-6 and check to see if the gauge pointer swings to each position: F.1/2 and E by changing the resistance value.
If it does not, change the gauge assembly.

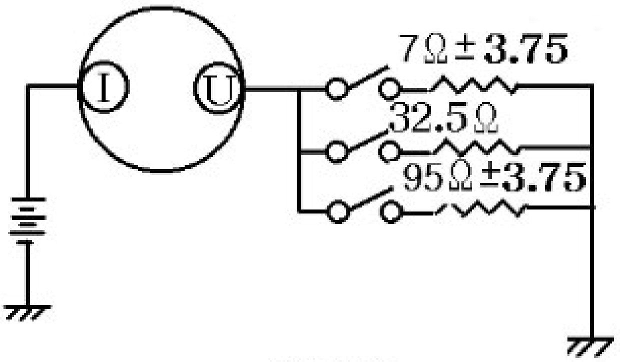


Fig.10-6

-Fuel gauge sensor (variable resistor)
Check each resistance value with a tester at each float position as shown in Fig.10-7.if the measured values are deviated from respective specified values, replace the sensor assembly.

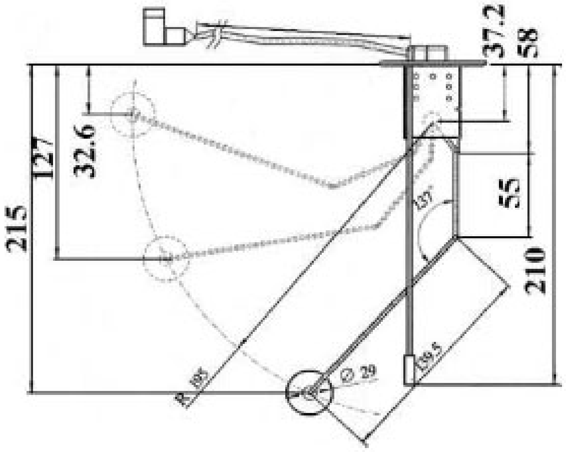


Fig.10-7

Standard pointer position	F	(1/2)	E
Regulated resistance(Ω)	7	32.5	95
Sensor Unit resistance(Ω)	± 4	± 4	± 4

Note:
1) Figures in parentheses are reference value
2) Inspect each position in order F to E
3) Read values in three minutes.

1.4.Thermometer

a. Construction

This is the same moving magnet type meters as the fuel gauge. As the coolant temperature becomes higher, the resistance in the thermo unit (sensor) become lower, which results in more current to the meter circuit and swinging the meter pointer to the high temperature side on the scale. Of course, as the coolant temperature become lower, everything acts in reverse.

b. Inspection

Normally the thermometer resisters higher values as the coolant temperature rises after the engine is running. If it does not, check the wiring first. If the wiring is normal. Replace assembly.

2. STARTER SWITCH

(1) Removal
a. Remove the dash cover (Upper)
b. Remove the ring nut holding the starter switch using a conventional screw driver.
c. Pull out the key switch as shown in Fig.10-8

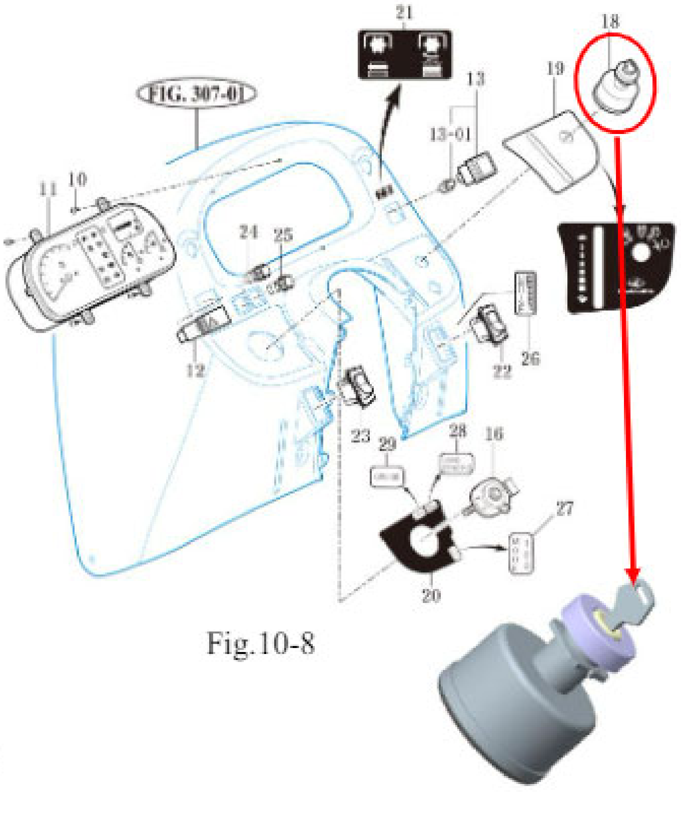


Fig.10-8

(2) Inspection

a. The main switch circuit, switching positions, and terminals are as shown in the figures. Check the continuity across respective terminals referring to the switch circuit diagram. Replace a defective switch as an assembly

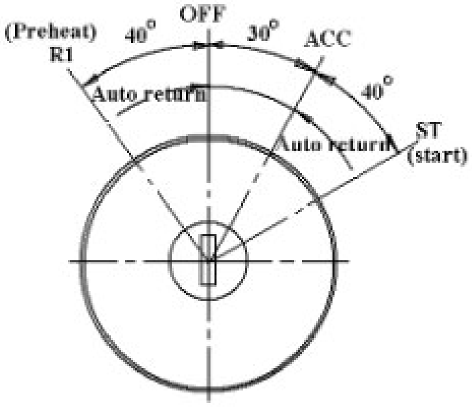
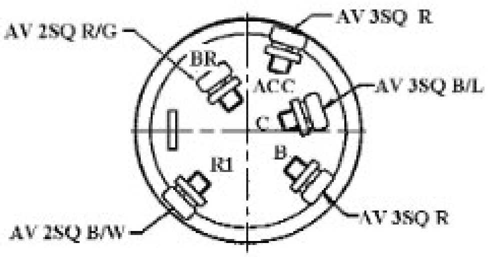


Fig.10-9



Key \ terminal	B	BR	R1	R2	C	ACC
OFF	○					
R1	○	○	○			
ACC	○	○				○
ST	○	○			○	○

Fig.10-10

3. COMBINATION SWITCH

1) Removal

(1) Remove the meter panel

(2) Remove the light switch knob and turn signal switch lever.

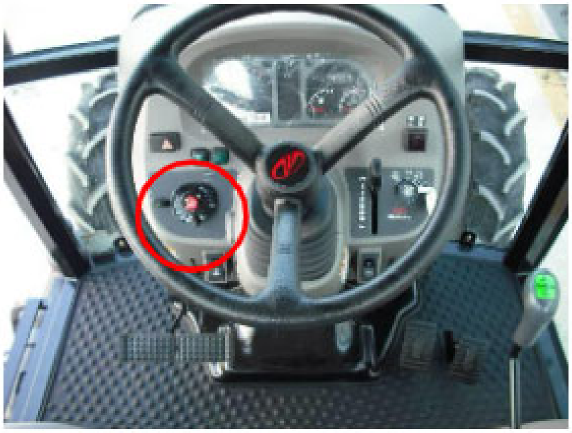


Fig.10-11

(3) Release the ring nut with a conventional screw drive(-) and remove the combination switch.

2) Inspection

Each switch circuit is as shown, so check each switch for a continuity across respective terminals with a tester. Replace a defective switch as an assembly.

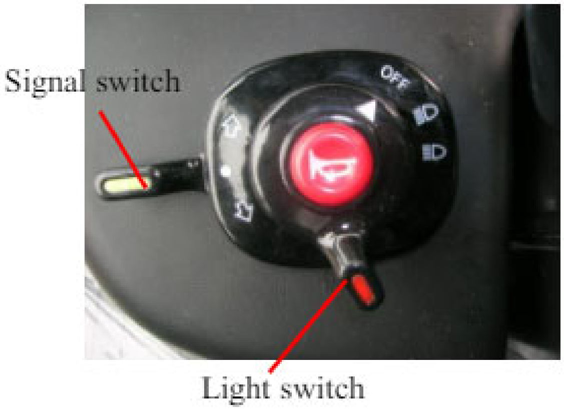
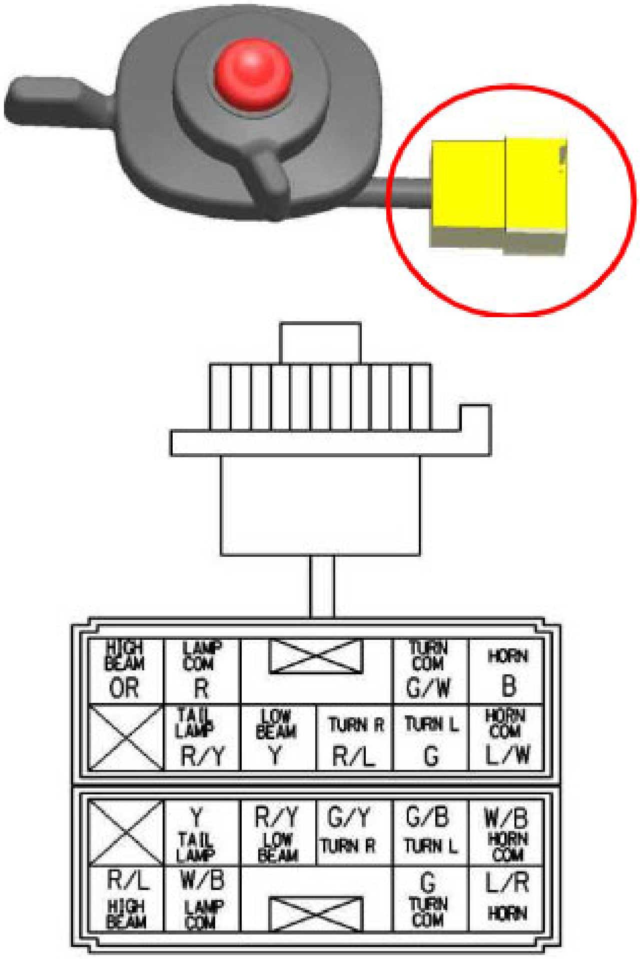


Fig.10-12 combination switch



HIGH BEAM OR	LAMP COM R	☒		TURN COM G/W	HORN B
☒	TAIL LAMP R/Y	LOW BEAM Y	TURN R R/L	TURN L G	HORN COM L/W

☒	Y TAIL LAMP	R/Y LOW BEAM	G/Y TURN R	G/B TURN L	W/B HORN COM
R/L HIGH BEAM	W/B LAMP COM	☒		G TURN COM	L/R HORN

Fig.10-13 Harness socket

4. STOP LIGHT SWITCH

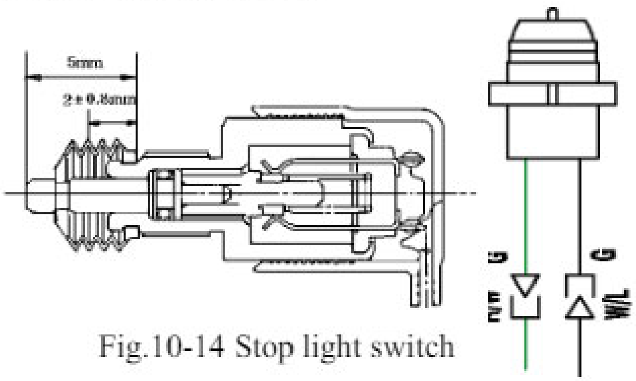


Fig.10-14 Stop light switch

Capacity	10~20A (DC12V)
Stroke to ON	3 ±0.5mm
Total stroke	8mm

5.RELAY UNIT

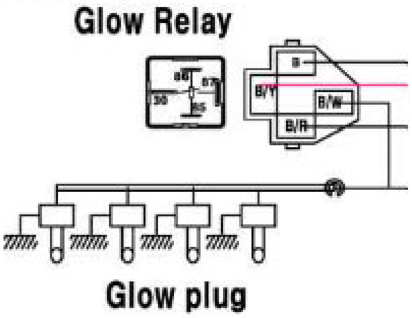


Fig.10-15 Relay unit

6. FUSE

Fuses are installed in the main fuse box and one for the headlights. Three fusible links are installed to prevent the wiring from burning due to a short circuit.

7. CONTROLLER

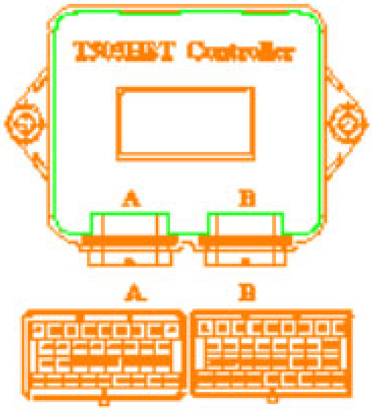


Fig.10-16

Capacity	DC12V
Operating range	DC10~16V
Operating temperature	-15~80ºC

1).Function

A. Engine Start control

Engine can be started on the condition of Brake S/W ON, and PTO S/W OFF Position

No	Switch	Operation
1	Brake S/W OFF or PTO lamp S/W ON	Start relay OFF
2	Brake S/W ON and PTO lamp S/W OFF	Start relay ON

B. Preheat control

No	Sensor	Operation
1	Key S/W	Glow relay ON till t seconds
2	Glow S/W	Glow relay ON
3	Starter S/W	Glow relay ON

Note:
it is 16 seconds to the glow time jumper is at ON Position, and 8 seconds at OFF Position

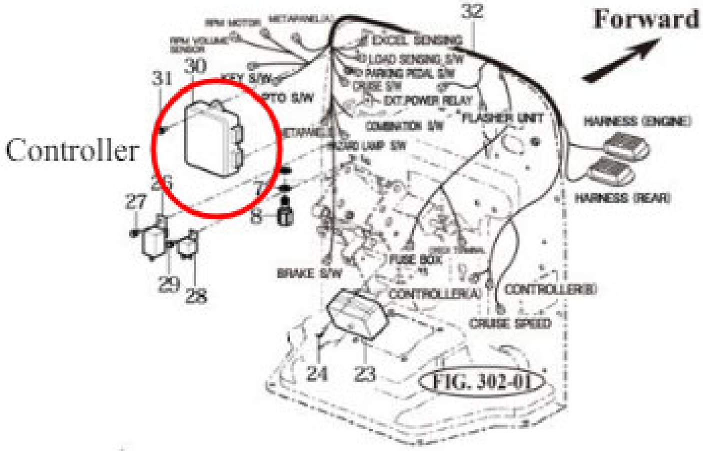
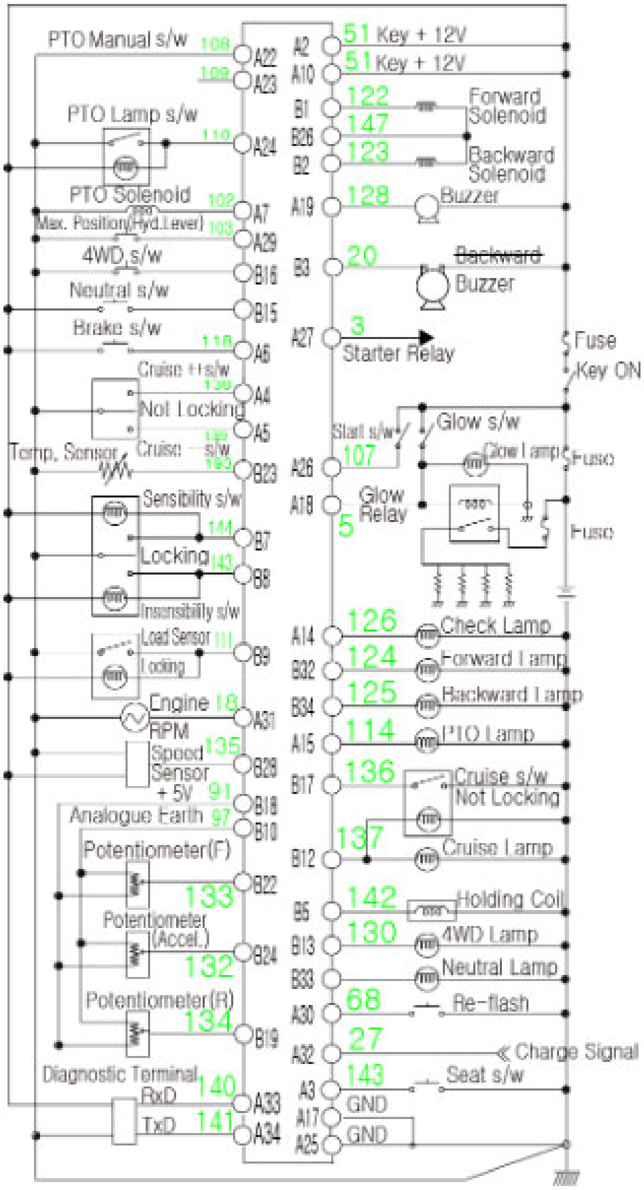
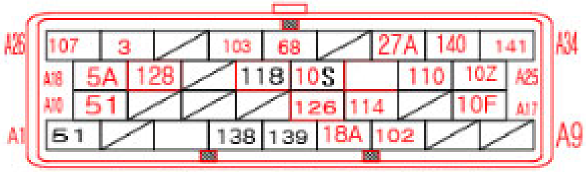


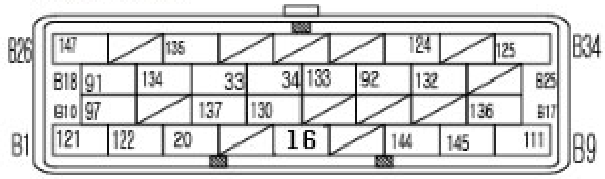
Fig.10-17 Controller

2). CIRCUIT DIAGRAM



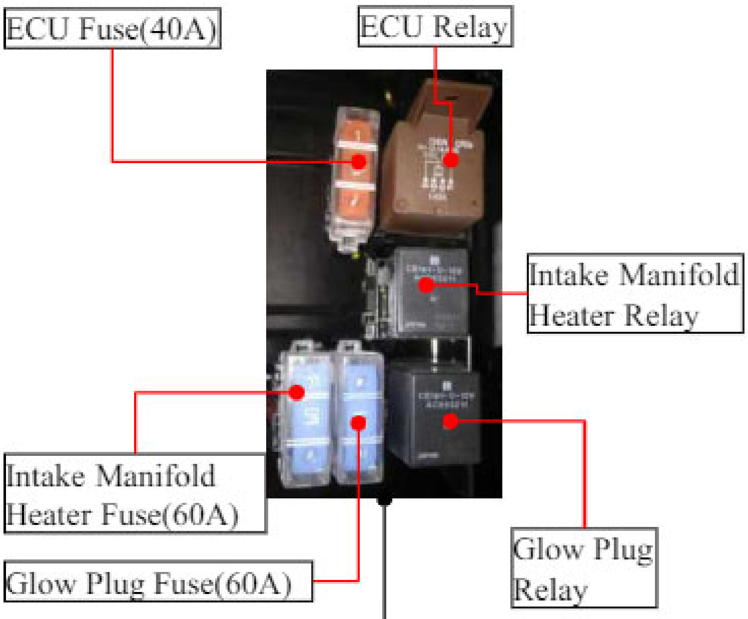


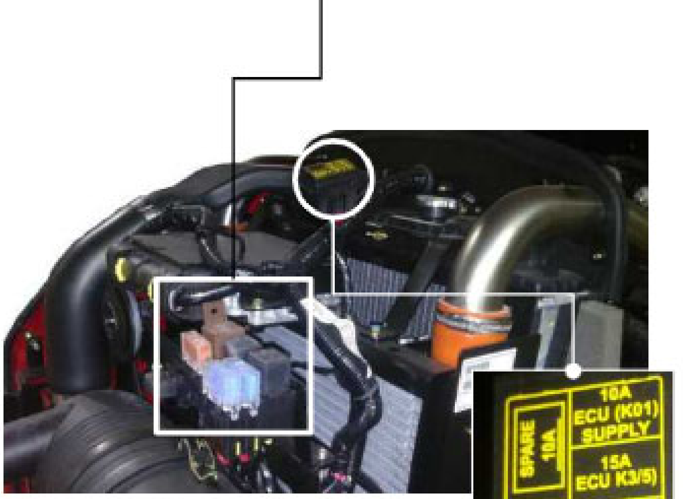
1.Constant Power 2.ACC Power 3.Safety Switch 4. AD Switch
5.Shifting Switch 6,8,9,11,12,13.NC 7.PTO Sol 10.ACC Power
14. Check Lamp 15. PTO Lamp 16.Driving Mode 17.GND
18.Glow Relay 19.Buzzer 20,21.NC 22.PTO Manual S/W
23.PTO Auto. S/W 24.PTO Lamp S/W 25.GND 26.Starter Switch
27.Starter Reley 28.Working(2step) 29.Limited Switch(Hyd. Lever)
30.Re-flash 31.RPM Signal 32.Charging Signal 33.Diagnostic(RxD)
34.Diagnostic(TxD)



1.Forward Sol+ 2.Backward Sol+ ~~3.4WD Sol~~ 5,6.NC
7.Forward Switch 8.Neutral Switch 9.Backward Switch
10.GND 11.AB Lamp 12.QT Lamp 13.4WD Lamp 14.AD Down S/W
15.Speed Sensor 16.2WD 17.Overrunning speed 18.5V
19.Motor Potentiometer 20.AB Motor(F) 21.AB Motor(R)
22.Clutch Potentiometer 23.Temp. Sensor 24.Steering Angle Sensor
25,27,29,31.NC 26.Driving Sol- 28.Speed Sensor 32.Forward Lamp
33.Neutral Lamp 34.Backward Lamp

Fig.10-18 connector





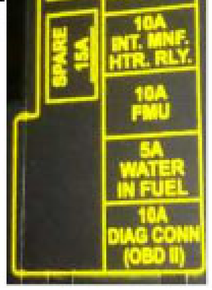
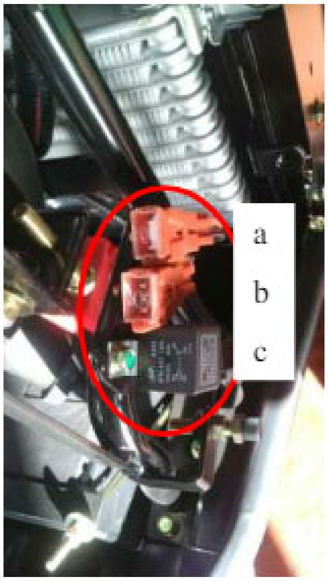


Fig.10-19 Relay and Fuse from MnM



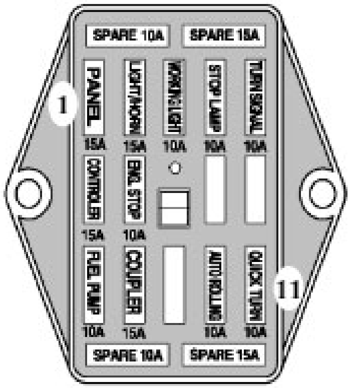
a. Cabin Fuse(50A)

b. Main Fuse(50A)

c. Starter Relay

Fig.10-20 Relay and Fusiblelink

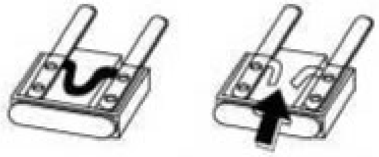
3). Each fuse is connected as follows



1. PANEL
2. LIGHT, HORN
3. WORKING LIGHT
4. STOP LAMP
5. TURN SIGNAL
6. CONTROLER
7. ENGINE STOP
8. FUEL PUMP
9. COUPLER
10. AUTO ROLLING
11. QUICK TURN

Fig.10-21

The circuit has 11 blade type fuses in its wiring circuit. When a fuse has blown replace it with one of the same value.



Normal Blown out

Fig.10-22

1	FUSE BOX
2	SLOW BLOW FUSE
3	UNITS FOR DIRECTION SIGNAL RELAY FOR THE POWER
4	PTO MONITOR
6	COUPLER FOR THE TRAILER

A	HEAD LAMP	12V55W
B	DIRECTION SIGNAL LAMP	12V21W
	STOP LAMP BACK LIGHT	21/5W
C	META PANEL LIGHT	12V3.4W
D	WORKING LAMP	12V35W
E	DIRECTION SIGNAL LAMP	12V21W
	SIDE LAMP	21V5W
F	NUMBER LAMP (EU)	12V10W

Note : Using a large capacity fuse or wire burn out the wiring system.
Use fuse tongs to replace fuses

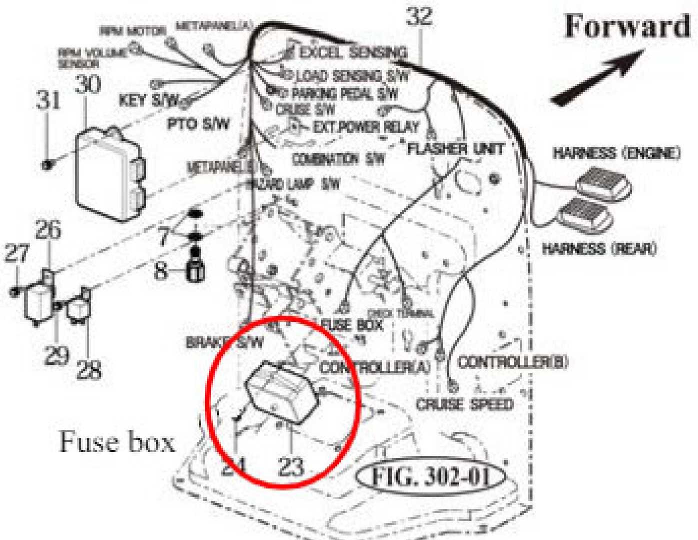


Fig.10-23

▶ Drawing for fixing position of the fuse

▶ Wiring diagram of the electric instrument

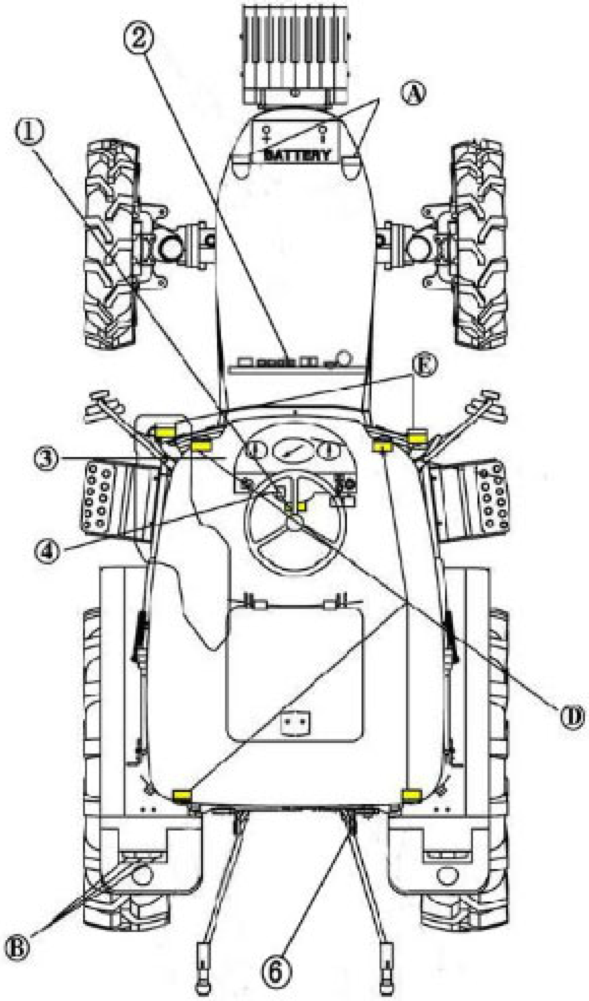


Fig.10-24

8.Trailer socket

A hella's 7-pin trailer socket is equipped as a standard equipment. Lamp on a trailer can be operated through the socket.

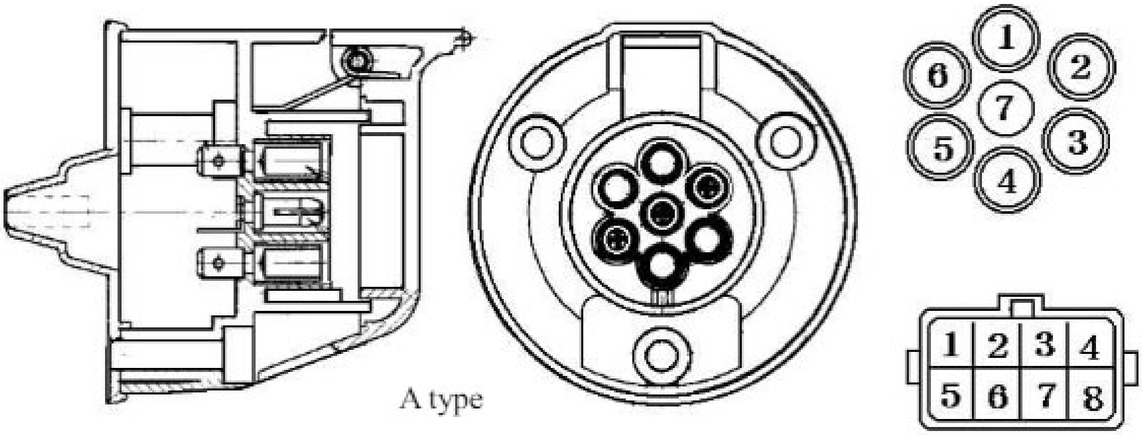


Fig.10-25

Socket No.	Description	Color		Specification	Wire Housing
		A type	B type		
1	Earth	B	W	AV 1.25	1
2	Small light(Tail light)	Y	B	AV 1.25	2
3	Turn signal (LH)	GB	Y	AV 1.25	3
4	Stop Light	WL	R	AV 1.25	4
5	Turn signal (RH)	GY	G	AV 1.25	5
6	Rear Light (License plate)	YW	Br	AV 1.25	6
7	Reserve light	WG	L	AV 1.25	7

Note:

Lamp on the trailer should be of the same size or smaller than those on the trailer.

9.Additional function

► CRUISE CONTROL BUTTON

■ Engaging Cruise Control

– Depress the forward speed control pedal until the required speed is achieved.
– Press the cruise control button to engage cruise control.
– Release the forward speed control pedal.
– The cruise control is only operational when the machine is traveling forward.

■ Disengaging Cruise Control

To disengage the cruise control you can either press the cruise control button or depress the brake pedal.

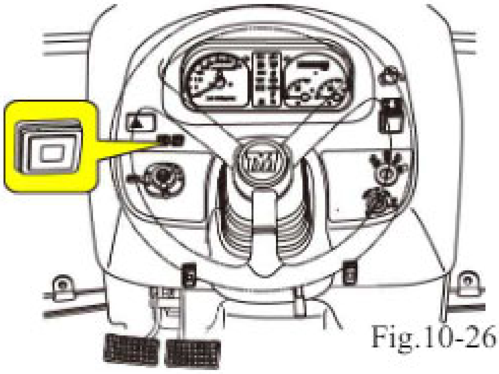


Fig.10-26

► CRUISE SPEED ADJUST SWITCH

Cruise speed can be increased and decreased while cruise control is engaged.

Press and release top of cruise speed adjust switch(+) to increase cruise speed by increment. Press and release again to increase cruise speed more by increment.
Press and release bottom of cruise speed adjust switch(-) to increase by increment. Press and release again to decrease cruise speed more by increment.
Adjusted setting is erased when cruise control is disengaged.

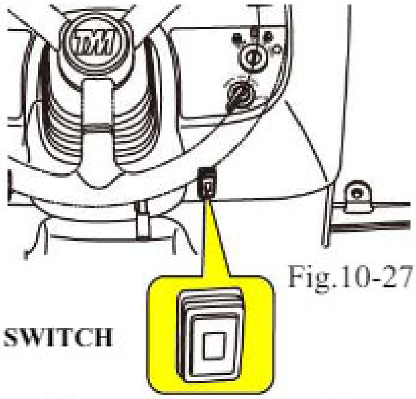


Fig.10-27

CRUISE SPEED SWITCH

► LOAD SENSING BUTTON

Load sensing function is used to prevent engine from stalling during heavy load application. Press load sensing button to activate load sensing function. If the engine speed drops more than 200 rpm, the controller reduce HST speed to help the engine to recover. The heavier load on the engine, the tractor speed is more and more reduced .
Press again the switch off the load sensing function.

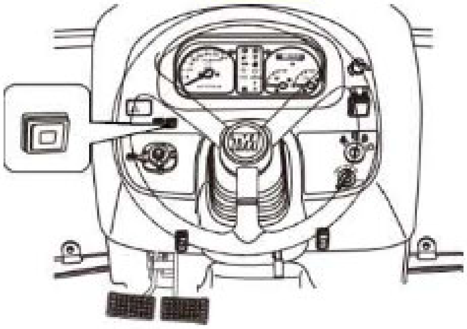

LOAD SENSING BUTTON

Fig.10-28

► MODE(SENSITIVITY) SWITCH

The tractor allows the user to choose a response sensitivity among three different modes.

■ Mode 1 : Fully depress top of mode switch to activate mode 1. This mode gives the higher response sensitivity to drive pedal movement. It will provide more quick changes in speed or direction. The tractor would be more jerky.

■ Mode 2 : Depress top or bottom of mode switch to activate mode 2. This mode gives the medium response sensitivity to drive pedal movement which is typical to most normal operating conditions.

■ Mode 3 : Fully depress bottom of mode switch to activate mode 3. This mode gives the slow response sensitivity to drive pedal movement.

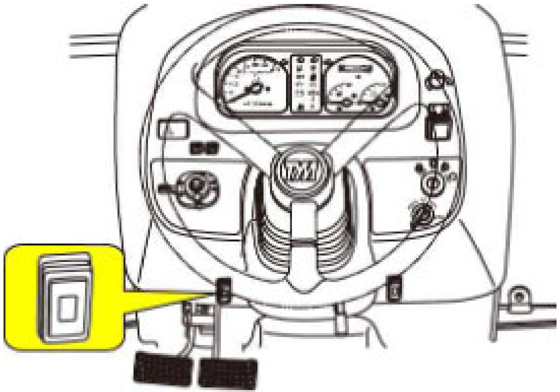
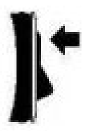
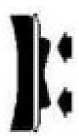
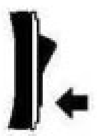


Fig.10-29

Mode 1	Mode 2	Mode 3
		

SECTION 5. EARTHING (GROUNDING) POINT

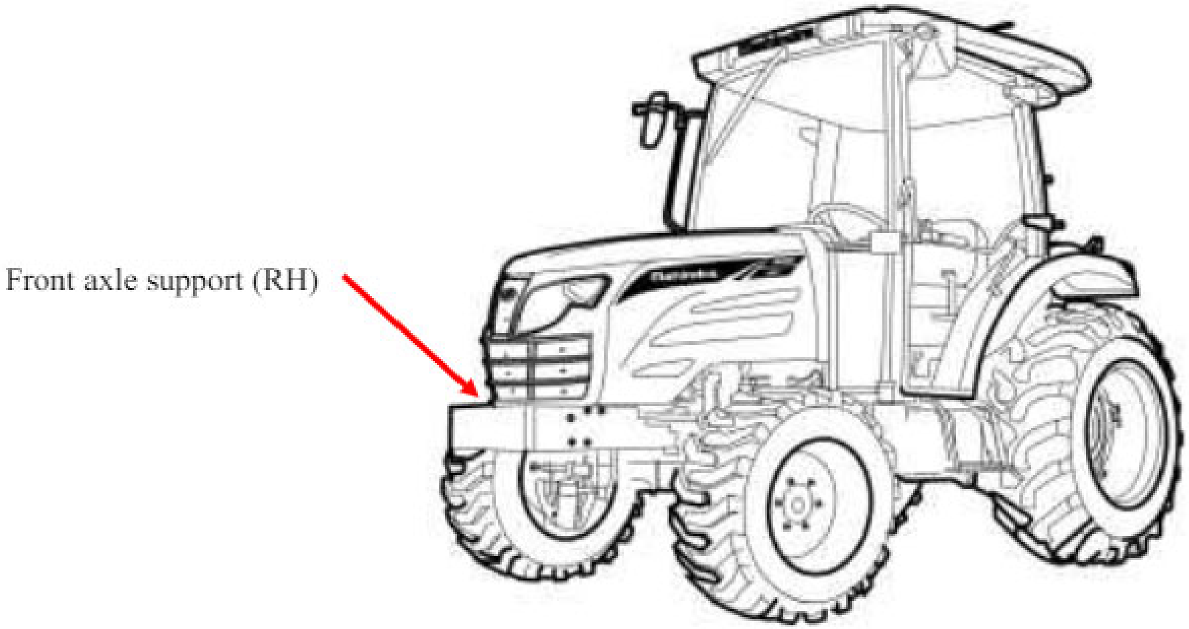


Fig.10-30

1) Front Axle Support (RH)

Earthed at upper tapped hole in the axle support.

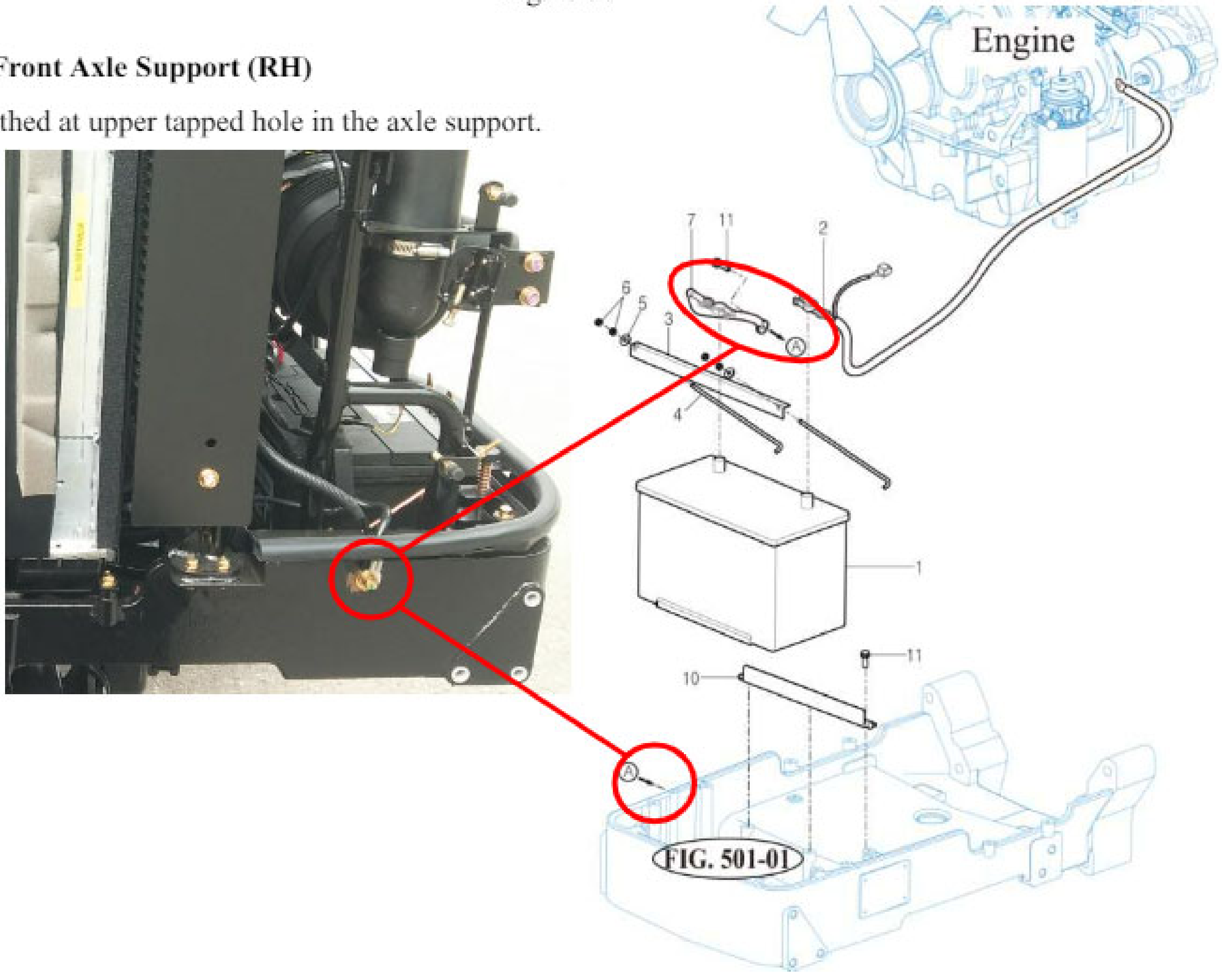


Fig.10-31

2655 HST Cab type WIRING DIAGRAM (A3)

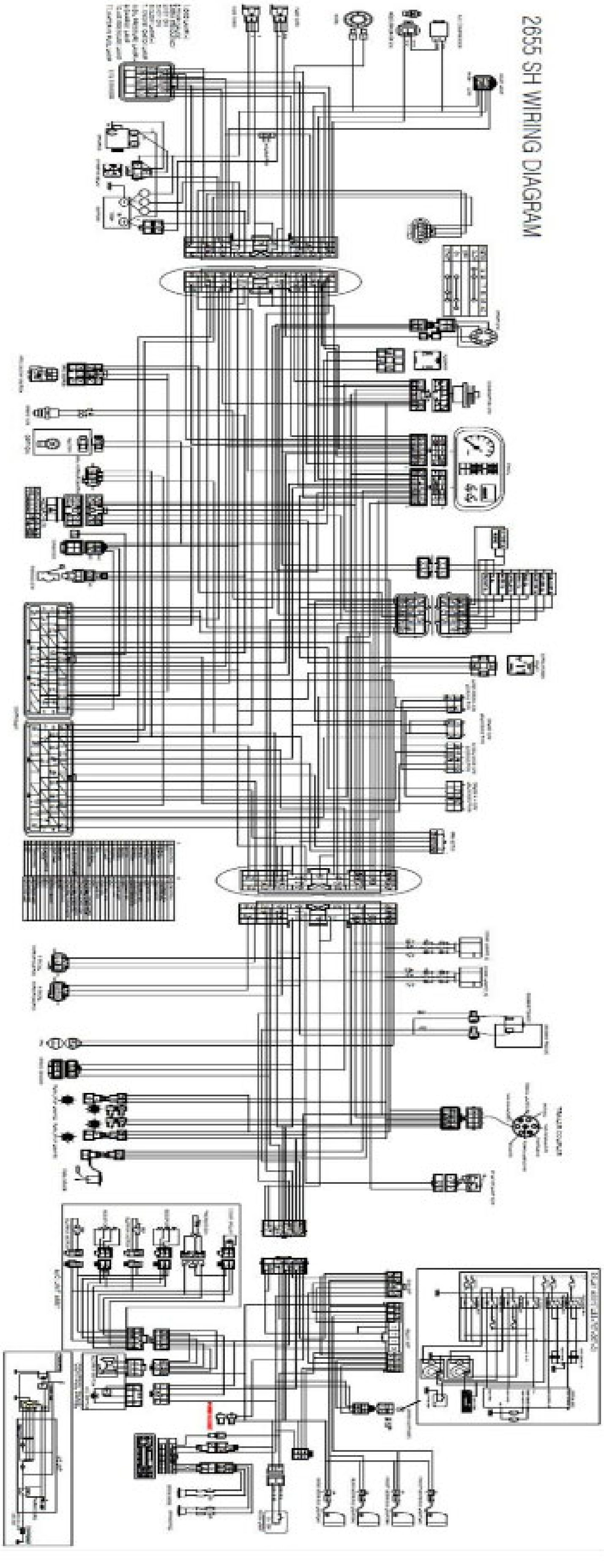


Fig.10-32

2655 HST Non Cab type WIRING DIAGRAM (A3)

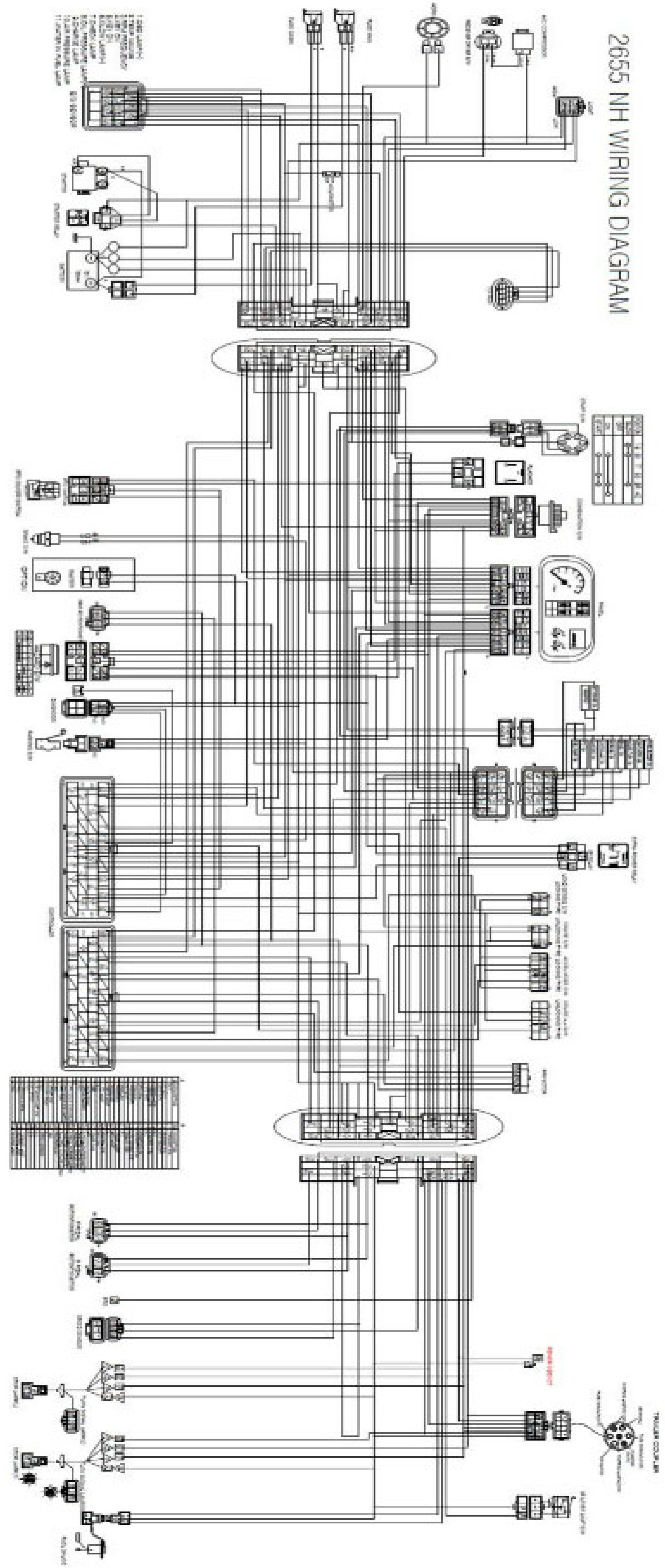


Fig.10-33

2655 HST ELECTRIC SYSTEM DIAGRAM

WIRING **(MAIN)**

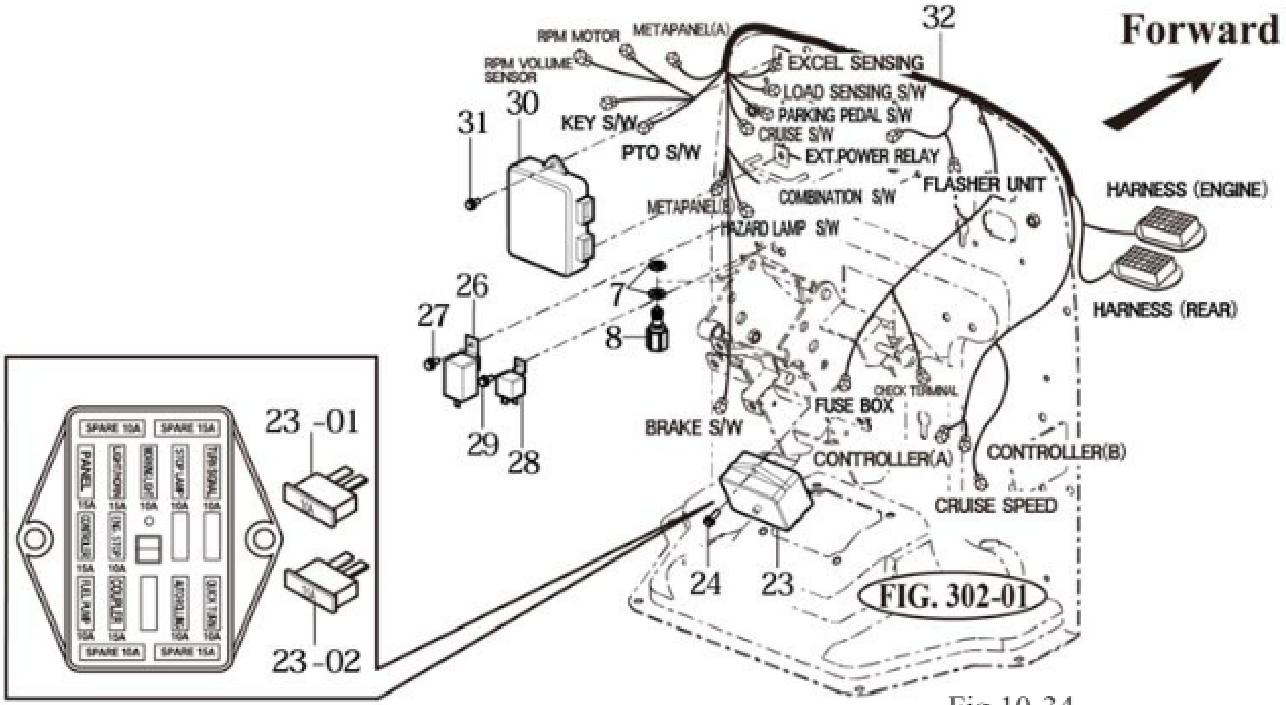
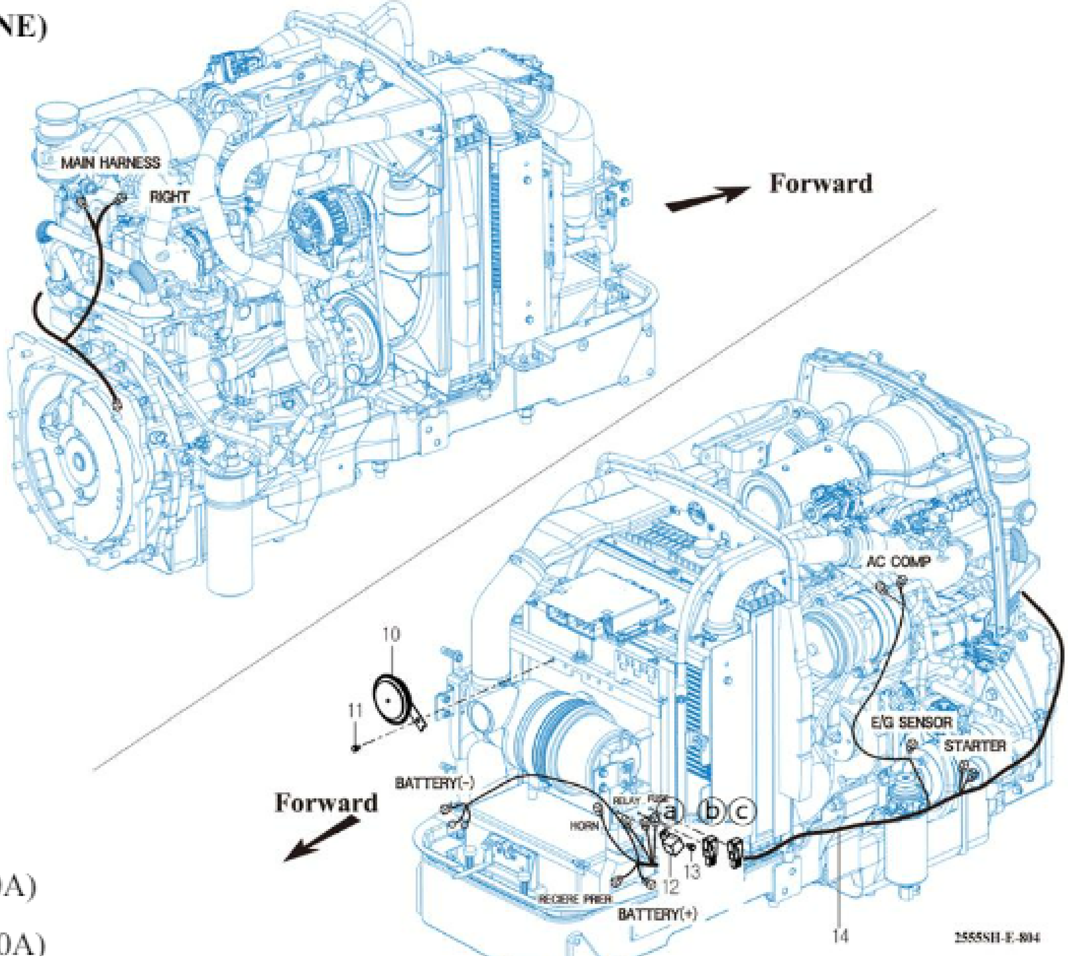


Fig.10-34

WIRING **(ENGINE)**



a. Starter Relay

b. Main Fuse(50A)

c. Cabin Fuse(50A)

Fig.10-35

2655 HST WIRING DIAGRAM (1)

WIRING **(REAR) – 2655 SH**

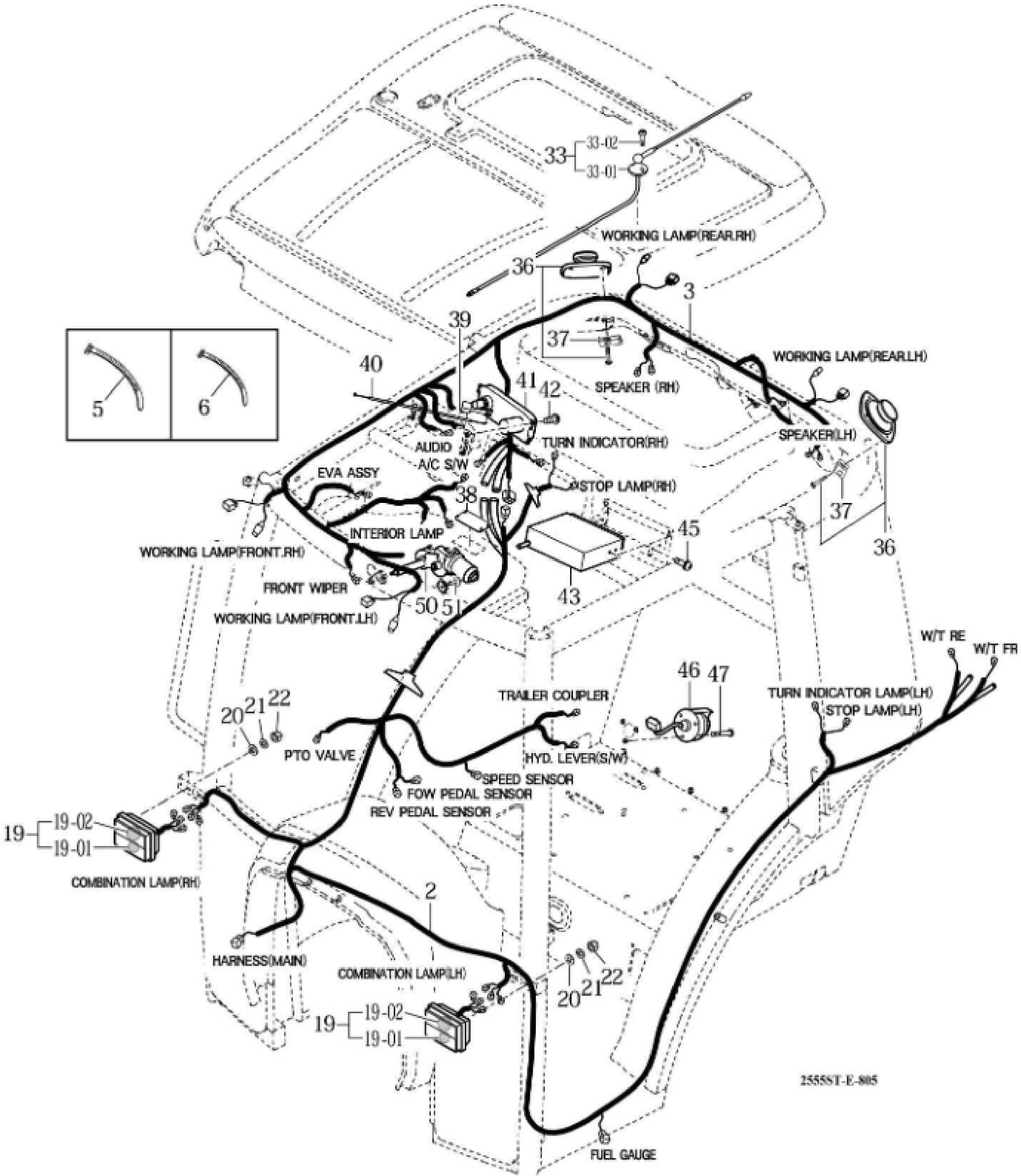


Fig.10-36

2655 HST WIRING DIAGRAM (1)

WIRING **(REAR) – 2655 NH**

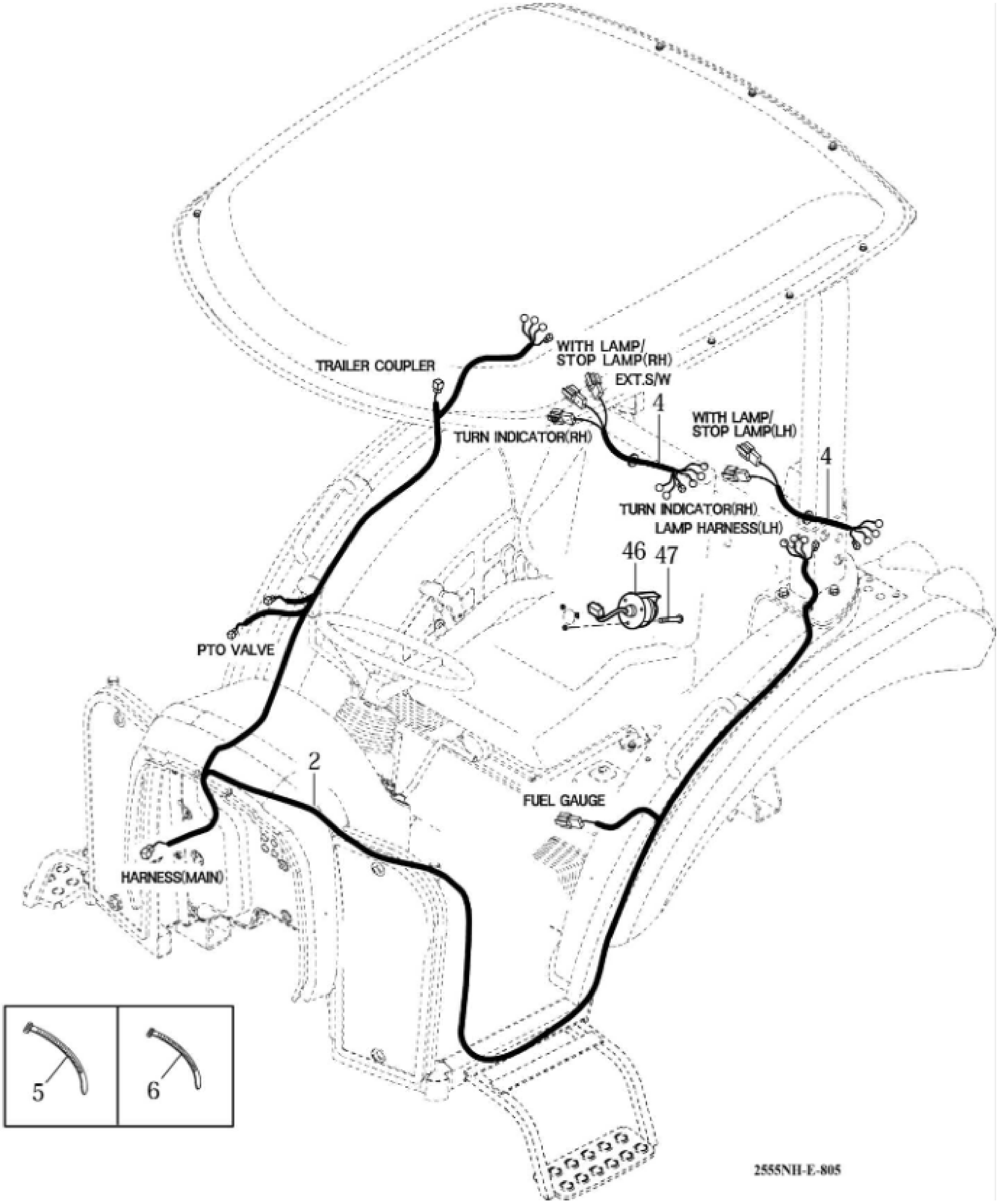


Fig.10-37

2655 HST WIRING DIAGRAM (2)

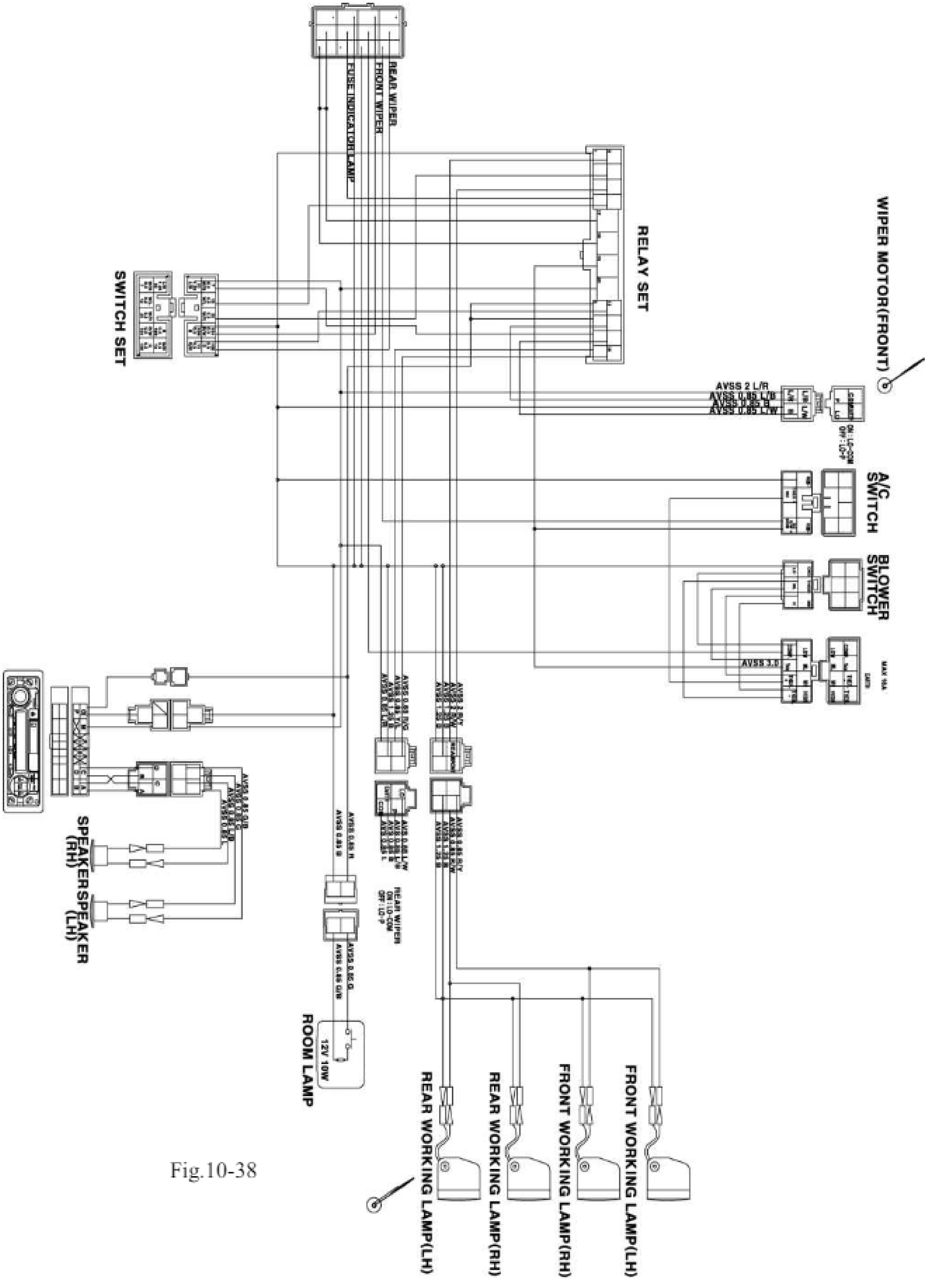


Fig.10-38

2655 HST WIRING DIAGRAM (3)

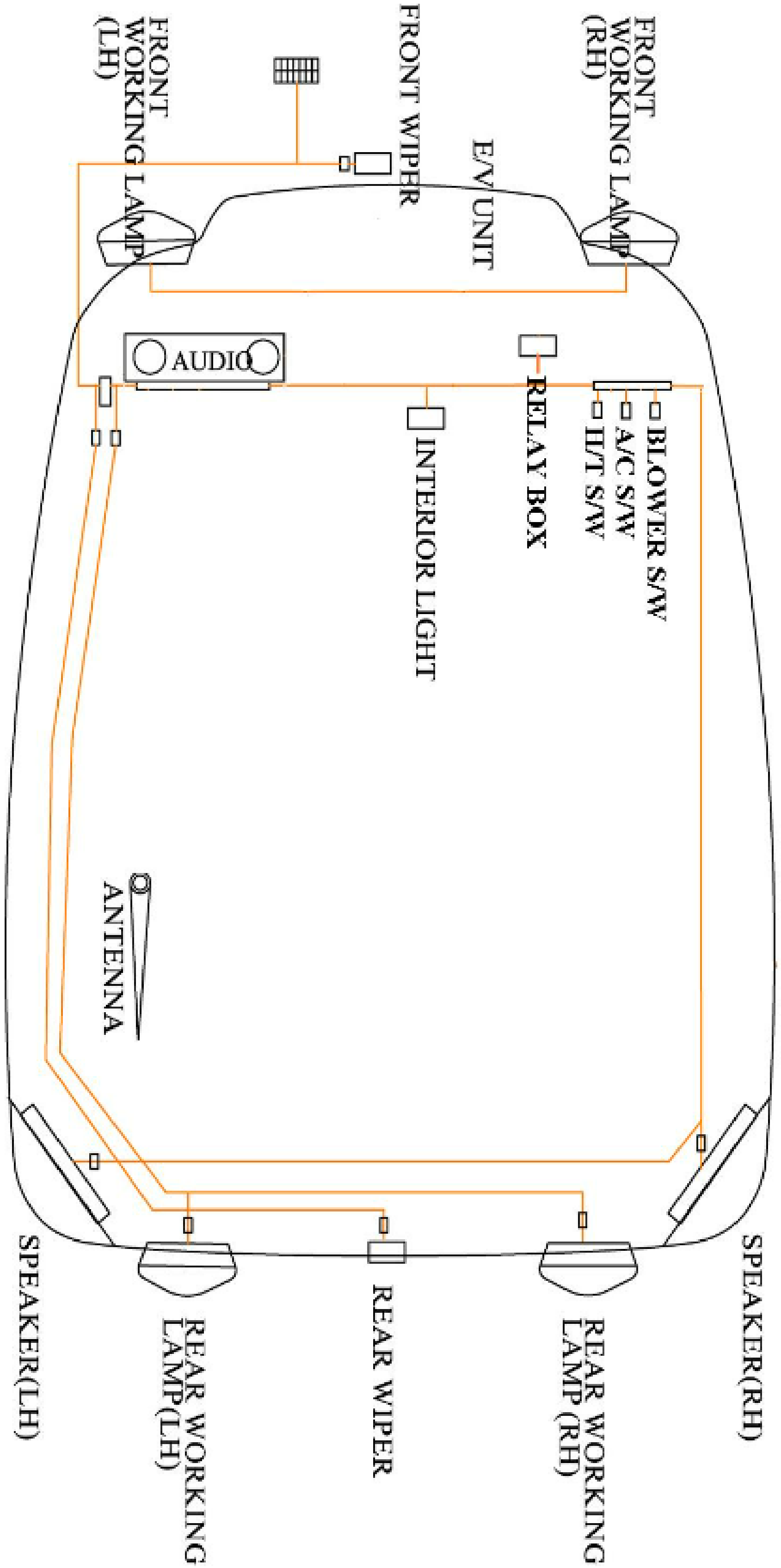


Fig.10-39

1) WIRING **(ENGINE)**

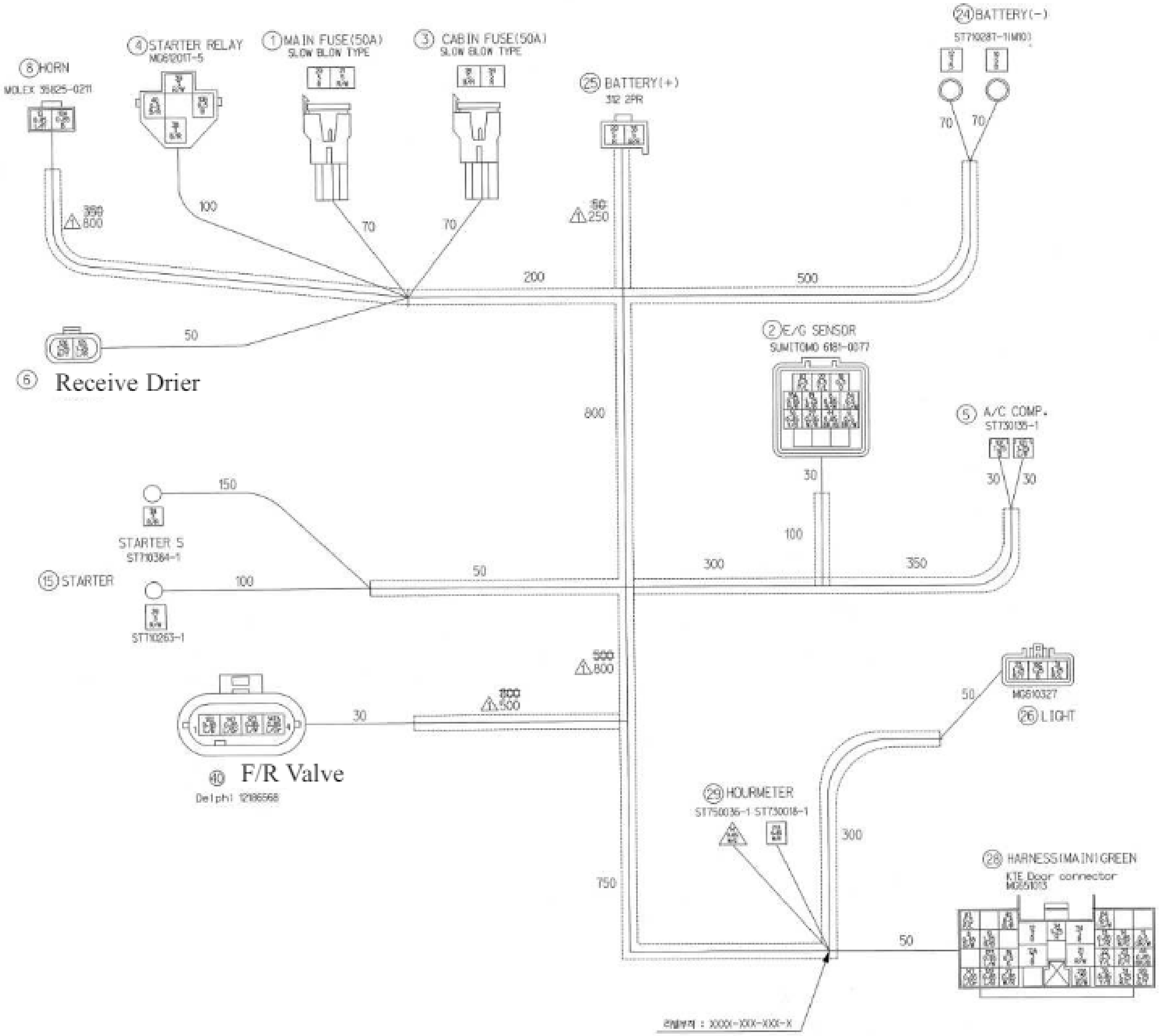


Fig.10-40

WIRING **(ENGINE)**

No	Term.	Pin	Term.	Pin	Size(㎟)	Color	Description A	Description B	Remarks
1	28	8	2	8	0.85	B/W	Harness Main	E/G Sensor	Pre-heating(+)
2	24	10			5	B	Battery(-)		
3			8	10A	0.85	B	10-10	Horn	
4			4	10B	0.5	B	10-10	Starter Relay	
5			26	10C	1.25	B	10-10	Light	
6			5	10F	1.25	B	10-10	A/C Comp	
7	28	11	2	11	0.5	Or/W	Harness Main	E/G Sensor	WIF
8	24	12	28	12	3	B	Battery(-)	Harness Main	
9			28	12A	3	B	12-12	Harness Main	
10	28	13	8	13	0.85	L/R	Harness Main	Horn	
11	28	14	29	14	0.85	W/G	Harness Main	Hourmeter	Hour
12	28	18	2	18	0.5	O	Harness Main	E/G Sensor	RPM
13	28	19	2	19	1.25	R/B	Harness Main	E/G Sensor	BR Power
14			18	19A	0.85	R/B	19-19	E/G Sensor	
15	1	20	25	20	5	R	Main Fuse	Battery(+)	
16	1	21			5	R/W	Main Fuse		Main Power
17			28	21	3	R/W	21-21	Harness Main	
18			28	21A	1.25	R/W	21-21	Harness Main	
19	28	22	2	22	0.5	Y/L	Harness Main	E/G Sensor	Water Temp. Gauge
20	28	23	26	23	1.25	R/Y	Harness Main	Light	Low
21	28	27	2	27	0.85	W/R	Harness Main	E/G Sensor	Charge Lamp
22			29	27A	0.85	W/R	Harness Main	Hourmeter	
23	28	30	2	30	0.85	Y/B	Harness Main	E/G Sensor	Engine Oil Pressure
24	28	31	26	31	1.25	R/L	Harness Main	Light	High
25	28	34			5	R	Cabin Fuse	34-34	
26			28	34	3	R	34-34	Harness Main	
27			28	34A	1.25	R	34-34	Harness Main	
28	3	35	25	35	5	B/R	Cabin Fuse	Battery(+)	
29	4	38	15	38	3	B/R	Starter Relay	Starter	S
30	4	39	15	39	3	R/W	Starter Relay	Starter	
31	28	40	4	40	0.5	B/R	Harness Main	Starter Relay	Controller S
32	28	44	2	44	0.85	Br/B	Harness Main	E/G Sensor	Air Press
33	28	83	2	83	0.5	P/L	Harness Main	E/G Sensor	Onboard Lamp(-)
34	28	84	2	84	0.5	Lg/W	Harness Main	E/G Sensor	Diagno Lamp(-)
35	28	120	6	120	1.25	G/Y	Harness Main	Receive Drier	
36	6	121	5	121	1.25	L/R	Receive Drier	A/C Comp	Cabin Type
37	28	122	40	122	0.85	L/B	Harness Main	F/R Solenoid Valve	F Sol +
38	28	123	40	123	0.85	L/W	Harness Main	F/R Solenoid Valve	R Sol +
39	28	147	40	147	0.85	L/Or	Harness Main	F/R Solenoid Valve	
40			40	147A	0.85	L/Or	147-147	F/R Solenoid Valve	

2) WIRING **(MAIN)**

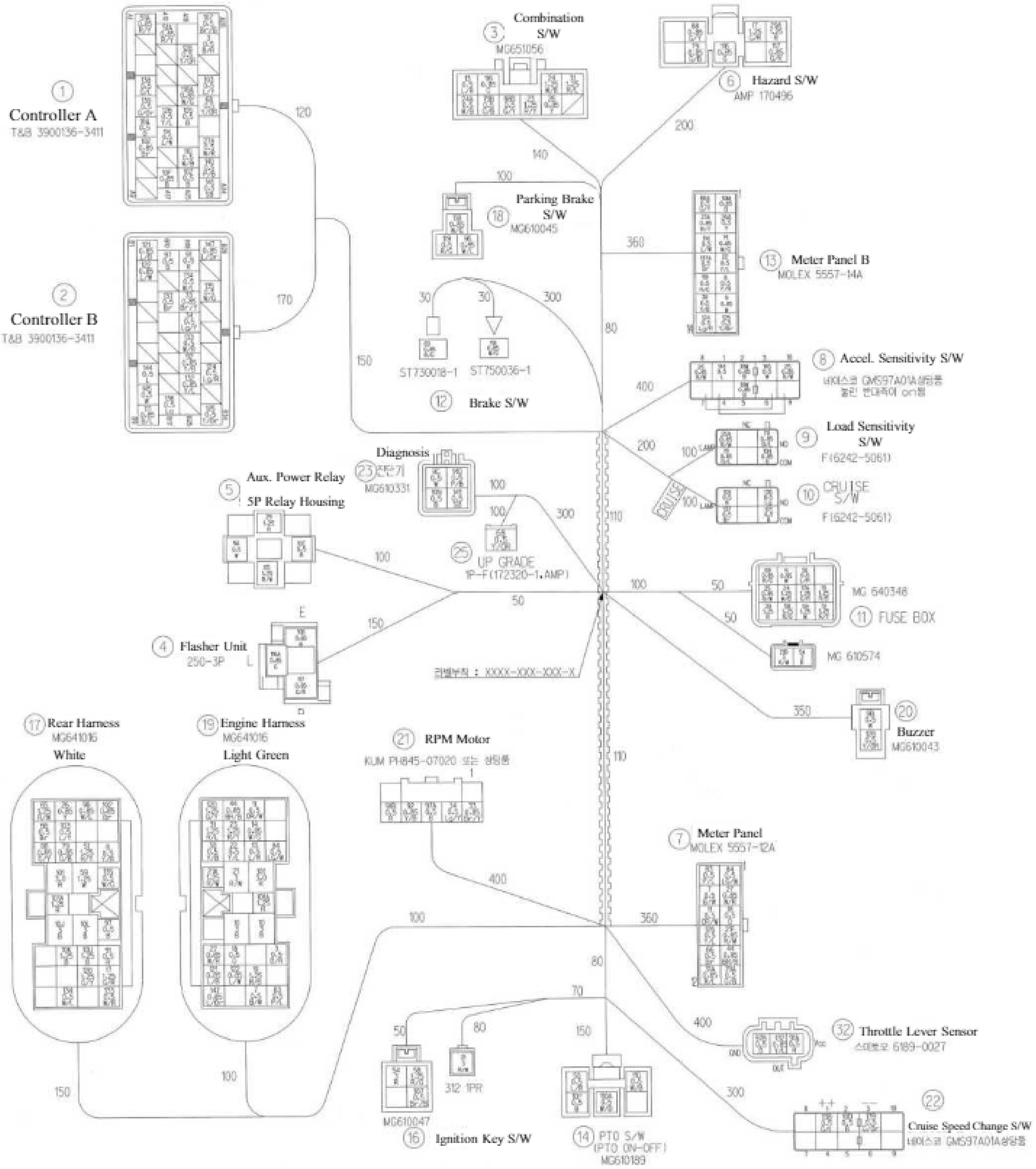


Fig.10-41

WIRING **(Main)**

No	Term.	Pin	Term.	Pin	Size(㎟)	Color	Description A	Description B	Remarks
1	19	3	1	3	0.5	B/R	Harness, Engine	Controller A27	Starter S+
2	19	7	7	7	0.5	B/W	Harness, Engine	Meter Panel(A)	Pre-heating Lamp
3	17	8	13	8	0.5	Y/R	Harness, Rear	Meta Panel(B)	Fuel Gauge
4	11	9	13	9	0.85	W	Fuse Box	Meta Panel(B)	Power +
5			5	9A	0.5	W	9-9	Aux. Power Relay	
6			20	9B	0.5	W	9-9	Buzzer	
7			23	9C	0.5	W	9-9	Diagnosis	
8	19	10	19	10	3	B	Harness, Engine	Harness, Engine	Earth
9			4	10B	0.85	B	10-10	Flasher Unit	
10			5	10C	0.5	B	10-10	Aux. Power Relay	
11			22	10D	0.5	B	10-10	Cruise Speed Change S/W	
12			1	10F	0.85	B	10-10	Controller A17	
13			9	10H	0.85	B	10-10	Load Sensitivity S/W	
14			17	10J	3	B	10-10	Harness, Rear	
15			17	10K	1.25	B	10-10	Harness, Rear	
16			17	10L	3	B	10-10	Harness, Rear	
17			13	10M	0.85	B	10-10	Meta Panel(B)	
18			23	10N	0.5	B	10-10	Diagnosis	
19			14	10P	0.5	B	10-10	PTO S/W	
20			1	10S	0.5	B	10-10	Controller PTO Manual	
21			17	10U	1.25	B	10-10	Harness, Rear	
22			8	10W	0.85	B	10-10	Accel. Sensitivity S/W	
23			10	10X	0.5	B	10-10	Cruise S/W	
24			10	10Y	0.5	B	10-10	Cruise S/W	
25			1	10Z	0.5	B	10-10	Controller A25	
26	19	11	7	11	0.5	Or/W	Harness, Engine	Meter Panel(A)	WIF
27	19	13	3	13	0.5	L/R	Harness, Engine	Combination S/W	Horn +
28	19	14	13	14	0.85	W/G	Harness, Engine	Meta Panel(B)	Interrupt
29	6	17	17	17	1.25	G/R	Hazard S/W	Harness, Rear	Turn Signal Power +
30			11	17A	1.25	G/R	17-17	Fuse Box	
31	19	18	7	18	0.5	O	Harness, Engine	Meter Panel(A)	Pulse
32			1	18A	0.5	O	18-18	Controller A6	
33	19	19	11	19	1.25	R/B	Harness, Engine	Fuse Box	Fuel Inject. Pump +
34	19	21	16	21	3	R/W	Harness, Engine	Ignition Key S/W	Battery +
35			19	21A	1.25	R/W	21-21	Harness, Engine	
36			11	21B	3	R/W	21-21	Fuse Box	
37			7	21F	0.85	R/W	21-21	Meter Panel(A)	
38	19	22	13	22	0.5	Y/L	Harness, Engine	Meta Panel(B)	Water Temp Sensor
39	19	23	3	23	1.25	R/Y	Harness, Engine	Combination S/W	Low Beam
40			13	23A	0.85	R/Y	23-23	Meta Panel(B)	

WIRING **(Main)**

No	Term.	Pin	Term.	Pin	Size(㎟)	Color	Description A	Description B	Remarks
41	11	24	3	24	1.25	W/B	Fuse Box	Combination S/W	Head Lamp, Horn Power +
42			3	24A	0.5	W/B	24-24	Combination S/W	
43	11	25	8	25	0.85	R/W	Fuse Box	Accel. Sensitivity S/W	e-Hydro Power
44			9	25A	0.85	R/W	25-25	Load Sensitivity S/W	
45	17	26	3	26	0.85	Y	Harness, Rear	Combination S/W	Taillight
46			13	26A	0.5	Y	26-26	Meta Panel(B)	
47	19	27	7	27	0.85	W/R	Harness, Engine	Meta Panel(A)	Interrupt
48			1	27A	0.5	W/R	27-27	Controller A32	Charge Signal
49	11	19	5	29	1.25	R	Fuse Box	Aux. Power Relay	Hazard Lamp Power +
50			6	29A	1.25	R	29-29	Hazard S/W	
51	19	30	13	30	0.5	Y/B	Harness, Engine	Meta Panel(B)	Oil Pressure Sensor
52	19	31	3	31	1.25	R/L	Harness, Engine	Combination S/W	High Beam
53			7	31A	0.85	R/L	31-31	Meta Panel(A)	
54	19	44	7	44	0.85	Br/B	Harness, Engine	Meta Panel(A)	Air Press
55	11	50	14	50	0.5	L/R	Fuse Box	PTO S/W	
56	11	51	17	51	1.25	R/Y	Fuse Box	Harness, Rear	Balance Control Power +
57			1	51A	0.85	R/Y	51-51	Controller A1, A10	Controller Power +
58	11	54	16	54	3	R	Fuse Box	Ignition Key S/W	
59	11	58	16	58	1.25	R/G	Fuse Box	Ignition Key S/W	
60	11	59	17	59	1.25	W	Fuse Box	Harness, Rear	Working Lamp Power +
61	17	65	5	65	1.25	R/W	Harness, Rear	Aux. Power Relay	
62	17	66	7	66	0.5	Br	Harness, Rear	Meta Panel(A)	Fuel Warning Lamp
63	1	68	25	68	0.5	Y/Or	Up-Grade	Controller A30	Upgrade
64	11	69	12	69	0.85	R/G	Fuse Box	Brake S/W	Brake, Back Lamp
65	17	79	6	79	0.85	G/B	Harness, Rear	Hazard S/W	Hazard Lamp L
66			7	79A	0.5	G/B	79-79	Meta Panel(A)	
67			3	79B	0.5	G/B	79-79	Combination S/W	
68	19	83	7	83	0.5	P/L	Harness, Engine	Meta Panel(A)	Onboard Lamp(-)
69	19	84	7	84	0.5	Lg/W	Harness, Engine	Meta Panel(A)	Diagnosis Lamp(-)
70	17	88	6	83	0.85	G/Y	Harness, Rear	Hazard S/W	Hazard Lamp R
71			13	88A	0.5	G/Y	88-88	Meta Panel(B)	
72			3	88B	0.5	G/Y	88-88	Combination S/W	
74	2	91	17	91	0.5	R	Controller B18	Harness, Rear	Power 5V
75			32	91A	0.5	R	91-91	Throttle Lever Volume	
76			21	91B	0.5	R	91-91	RPM Motor	
77	2	92	21	92	0.85	Y/B	Controller B23	RPM Motor	RPM Motor Position
78	18	96	17	96	0.85	W/L	Parking Pedal S/W	Harness, Rear	Stop Light
79	2	97	17	97	0.5	B	Controller B10	Harness, Rear	Analog Earth
80			21	97A	0.5	B	97-97	RPM Motor	
81			32	97B	0.5	B	97-97	RPM Volume	

WIRING **(Main)**

No	Term.	Pin	Term.	Pin	Size(㎟)	Color	Description A	Description B	Remarks
82	19	101	17	101	3	R	Harness, Engine	Harness, Rear	Cabin Power +
83	19	101A	17	101A	1.25	R	Harness, Engine	Harness, Rear	
84	17	102	1	102	0.85	Br	Harness, Rear	Controller A7	PTO Power
85	17	103	1	103	0.5	L/Y	Harness, Rear	Controller A29	Position Lever S/W
86	1	107	16	107	0.5	Br/B	Controller A26	Ignition Key S/W	Cabin
87	1	110	14	110	0.5	W/B	Controller A24	PTO S/W	PTO Lamp S/W
88			14	110A	0.5	W/B	110-110	PTO S/W	Ignition S/W
89	2	111	9	111	0.85	B/L	Controller B9	Load Sensitivity S/W	
90	1	114	13	114	0.5	L/W	Controller A15	Meter Panel	PTO Lamp
91	3	116	6	116	0.85	G	Combination S/W	Hazard Lamp S/W	F/L Power
92			4	116A	0.85	G	116-116	Flasher Unit	
93	4	117	6	117	0.85	G/R	Flasher Unit	Hazard Lamp S/W	Hazard Lamp Power
94	18	118	12	118	0.85	W/G	Parking Pedal S/W	Brake S/W	Brake Power
95			1	118A	0.85	W/G	118-118	Controller A21	
96	18	119	13	119	0.5	R/G	Parking Pedal S/W	Meter Panel(B)	Parking Lamp
97	19	120	17	120	1.25	G/Y	Harness, Engine	Harness, Rear	
98	2	121	19	121	0.85	L/B	Controller B1	Harness, Engine	Forward Solenoid +
99	2	122	19	122	0.85	L/W	Controller B2	Harness, Engine	Reverse Solenoid +
100	2	124	13	124	0.5	Lg/R	Controller B32	Meter Panel(B)	Forward Lamp
101	2	125	13	125	0.5	Y/Br	Controller B34	Meter Panel(B)	Reverse Lamp
102	1	126	7	126	0.5	Y/L	Controller A14	Meter Panel(A)	Check Lamp
103	1	128	20	128	0.5	Y/Or	Controller A19	Buzzer	Buzzer
104	2	132	32	132	0.85	Y/L	Controller B24	Throttle Lever Volume	
105	2	133	17	133	0.5	W/R	Controller B22	Harness, Rear	Forward Signal
106	2	134	17	134	0.5	W/L	Controller B19	Harness, Rear	Reverse Signal
107	2	135	17	135	0.5	W/G	Controller B28	Harness, Rear	Ground Speed Sensor
108	2	136	10	136	0.5	Lg	Controller B17	Cruise S/W	Cruise Signal
109	2	137	10	137	0.5	Br	Controller B12	Cruise S/W	Cruise Lamp
110			13	137A	0.5	Br	137-137	Monitor B11	
111	1	138	22	138	0.5	G/L	Controller A4	Cruise Speed Change S/W	Cruise ++
112	1	139	22	139	0.5	G/Or	Controller A5	Cruise Speed Change S/W	Cruise --
113	1	140	23	140	0.5	P/B	Controller A33	Diagnosis	Diagnosis RXD
114	1	141	23	141	0.5	Sb	Controller A34	Diagnosis	Diagnosis TXD
115	2	144	8	144	0.5	L	Controller B7	Accel. Sensitivity S/W	Sensitivity
116	2	145	8	145	0.5	W	Controller B8	Accel. Sensitivity S/W	Insensitivity
117	19	147	2	147	0.85	L/Or	Harness, Engine	Controller B26	Driving Sol. - Output
118	2	33	21	33	0.85	Br/Y	Controller B20	PRM Motor	Foot
119	2	34	21	34	0.5	Lg/Y	Controller B21	PRM Motor	Vent

3) WIRING **(REAR) – 2655 NH**

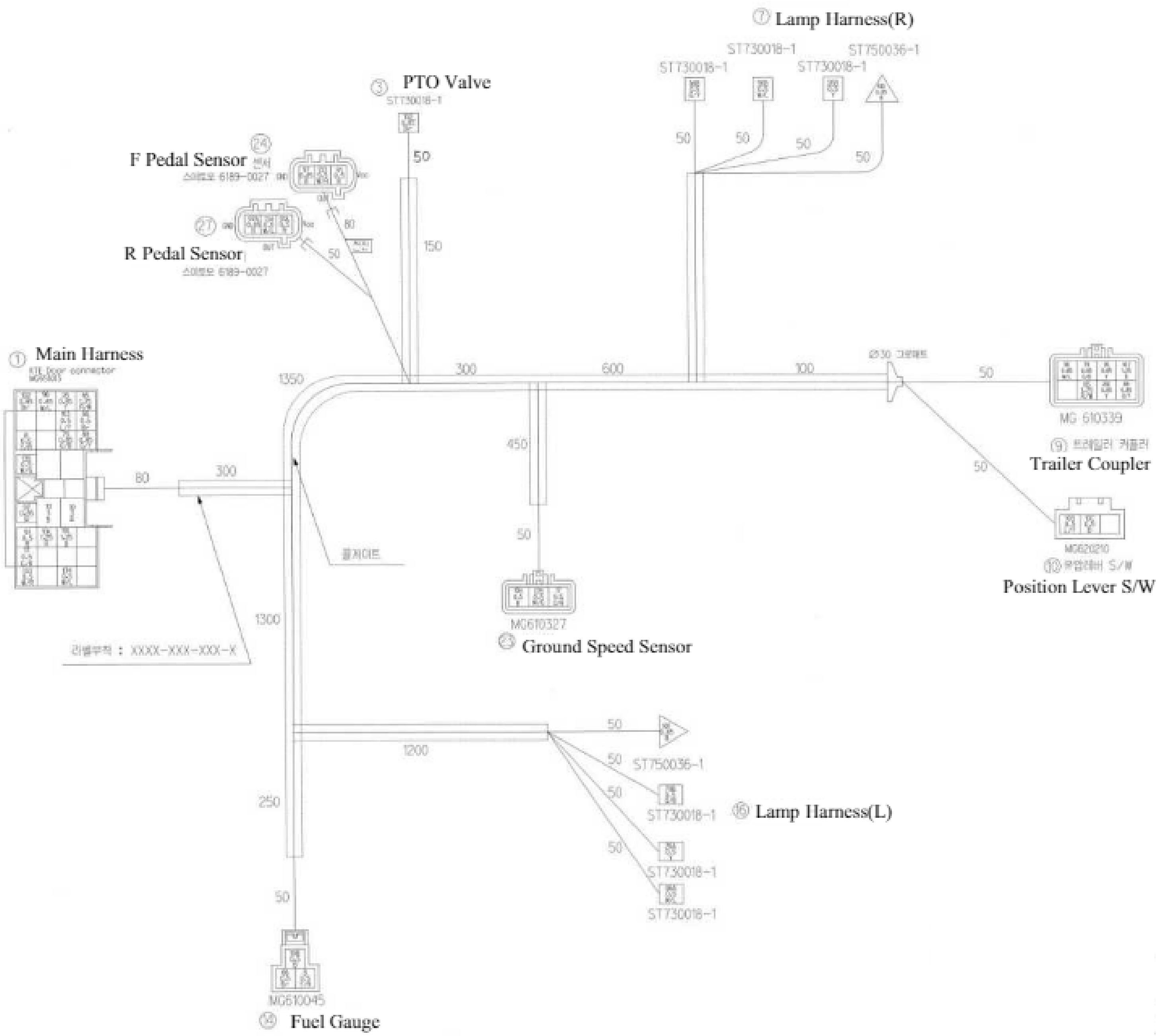


Fig.10-42

WIRING **(Rear) – 2655 NH**

No	Term.	Pin	Term.	Pin	Size(㎟)	Color	Description A	Description B	Remarks
1	1	8	14	8	0.5	Y/R	Harness, Main	Fuel Gauge	Fuel System
2	1	10			3	B	Harness, Main	10-10	
3			1	10A	3	B	10-10	Harness, Main	
4			14	10B	0.5	B	10-10	Fuel Gauge	
5			10	10C	0.5	B	10-10	Position Lever S/W	
6			7	10D	0.85	B	10-10	Lamp Harness(R)	
7			16	10F	0.85	B	10-10	Lamp Harness(L)	
8			23	10H	0.5	B	10-10	Ground Speed Sensor	
9			9	10I	1.25	B	10-10	Trailer Coupler	
10			1	10K	1.25	B	10-10	Harness, Main	
11			1	10L	1.25	B	10-10	Harness, Main	
12	1	17	23	17	1.25	G/R	Harness, Main	Ground Speed Sensor	
13	1	26	9	26	0.85	Y	Harness, Main	Trailer Coupler	Taillight
14			16	26A	0.5	Y	26-26	Lamp Harness(L)	
15			7	26B	0.5	Y	26-26	Lamp Harness(R)	
16			9	26E	0.85	Y	26-26	Trailer Coupler	
17	1	65	9	65	1.25	R/W	Harness, Main	Trailer Coupler	+12V
18			12	65A	1.25	R/W	65-65	Aux. Power	
19	1	66	14	66	0.5	Br	Harness, Main	Fuel Gauge	Level Sensor
20	1	79	9	79	0.85	G/B	Harness, Main	Trailer Coupler	Direction(L)
21			16	79B	0.5	G/B	79-79	Lamp Harness(L)	
22	1	88	9	88	0.85	G/Y	Harness, Main	Trailer Coupler	Direction(R)
23			7	88B	0.5	G/Y	88-88	Lamp Harness(R)	
24	1	91	24	91	0.5	R	Harness, Main	F Pedal Potentiometer	Power 5V
25			27	91A	0.5	R	91-91	R Pedal Potentiometer	
26	1	96	9	96	0.85	W/L	Harness, Main	Trailer Coupler	Stop Lamp
27			16	96A	0.5	W/L	96-96	Lamp Harness(L)	
28			7	96B	0.5	W/L	96-96	Lamp Harness(R)	
29	1	97	24	97	0.5	B	Harness, Main	F Pedal Potentiometer	Analog
30			27	97A	0.5	B	97-97	R Pedal Potentiometer	Earth
31	1	102	3	102	0.85	Br	Harness, Main	PTO Valve	
32	1	103	10	103	0.5	L/Y	Harness, Main	Position Lever S/W	
33	1	133	24	133	0.5	W/R	Harness, Main	F Pedal Potentiometer	Forward Signal
34	1	134	27	134	0.5	W/L	Harness, Main	R Pedal Potentiometer	Reverse Signal
35	1	135	23	135	0.5	W/G	Harness, Main	Ground Speed Sensor	

4) WIRING **(REAR, LH) – 2655 NH**

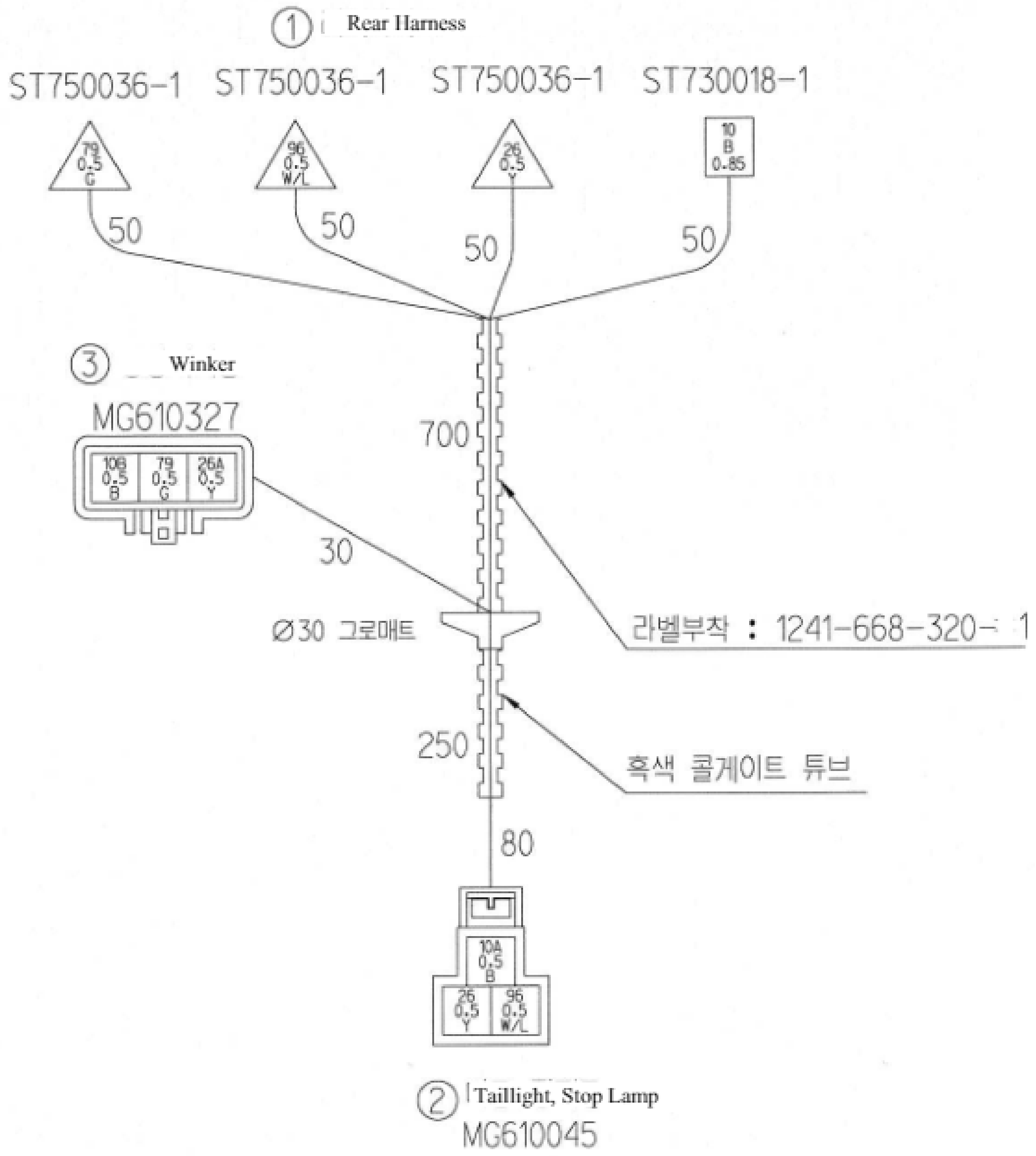


Fig.10-43

No	Term.	Pin	Term.	Pin	Size(㎟)	Color	Description A	Description B	Remarks
1	1	79	3	79	0.5	G	Rear Harness	Winker	Winker(L)
2	1	96	2	96	0.5	W/L	Rear Harness	Taillight, Stop Lamp	Stop Lamp
3	1	10			0.85	B	Rear Harness	10-10	
4			2	10A	0.5	B	10-10	Taillight, Stop Lamp	
5			2	10B	0.5	B	10-10	Taillight, Stop Lamp	
6	1	26	2	26	0.5	Y	Rear Harness	Taillight, Stop Lamp	Taillight
7			3	26A	0.5	Y	26-26	Winker	

4) WIRING **(REAR) – 2655 SH**

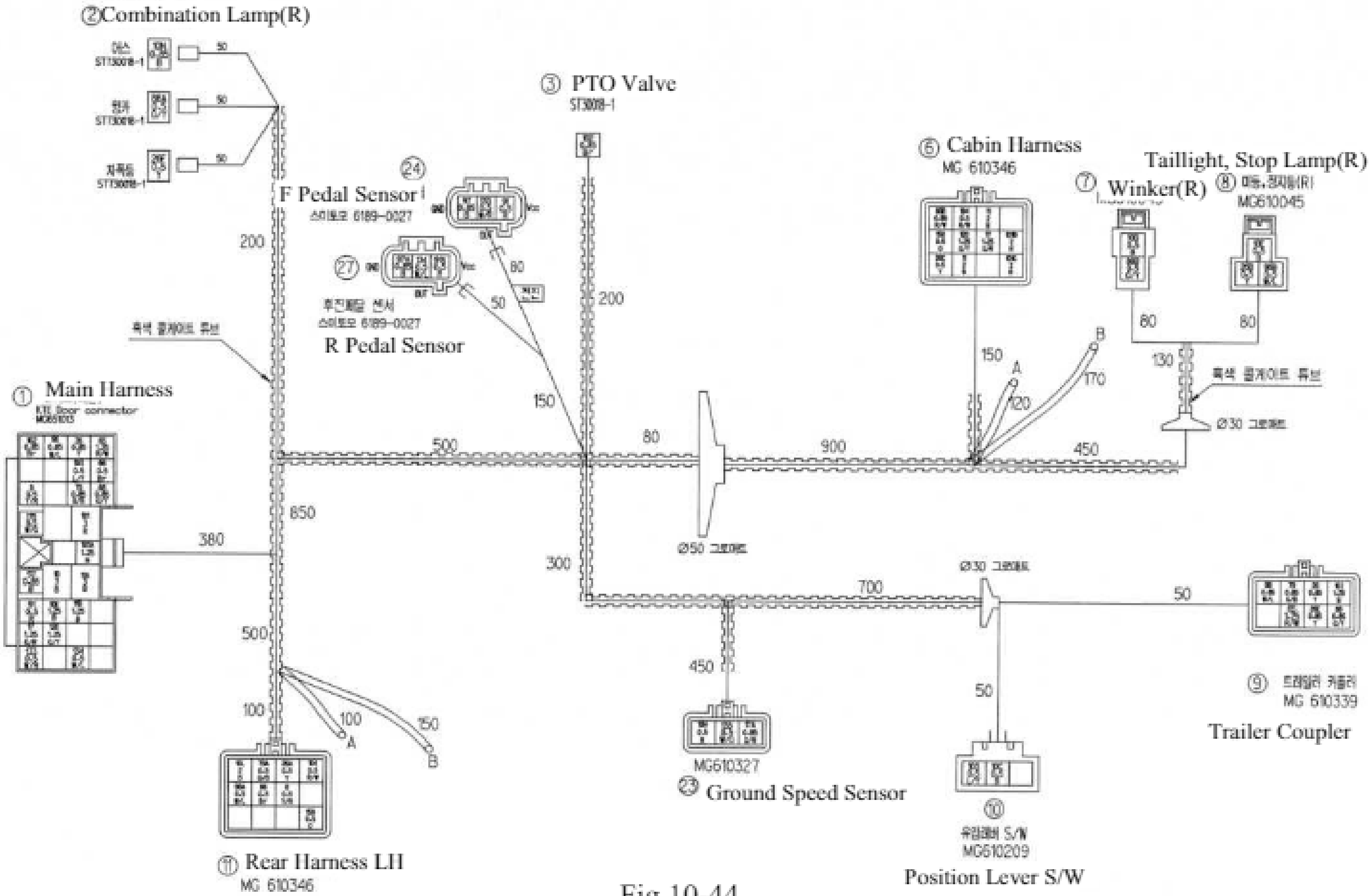


Fig.10-44

No	Term.	Pin	Term.	Pin	Size(㎟)	Color	Description A	Description B	Remarks
1	1	8	11	8	0.5	Y/R	Harness, Main	Harness, LH Rear	
2	1	10			3	B	Harness, Main	10-10	
3			10	10C	0.5	B	10-10	Position Lever S/W	
4			7	10D	0.5	B	10-10	Winker(R)	
5			8	10E	0.5	B	10-10	Taillight, Stop Lamp(R)	
6			23	10H	0.5	B	10-10	Ground Speed Sensor	
7			9	10I	1.25	B	10-10	Trailer Coupler	
8			1	10K	1.25	B	10-10	Harness, Main	
9			11	10L	2	B	10-10	Harness, LH Rear	
10			2	10N	0.85	B	10-10	Combination Lamp(R)	
11	6	11	6	11	2	B	Harness, Cabin	Harness, Cabin	
12			1	11A	3	B	11-11	Harness, Main	
13			1	11B	1.25	B	11-11	Harness, Main	
14	1	17	6	17	1.25	G/R	Harness, Main	Harness, Cabin	
15			23	17A	0.85	G/R	17-17	Ground Speed Sensor	
16	1	26	9	26	0.85	Y	Harness, Main	Trailer Coupler	
17			11	26A	0.5	Y	26-26	Harness, LH Rear	
18			8	26B	0.5	Y	26-26	Taillight, Stop Lamp(R)	

WIRING **(REAR) – 2655 SH**

No	Term.	Pin	Term.	Pin	Size(㎟)	Color	Description A	Description B	Remarks
19	1	26	6	26C	0.5	Y	26-26	Harness, Cabin	
20			9	26E	0.85	Y	26-26	Trailer Coupler	
21			2	26F	0.5	Y	26-26	Combination Lamp(R)	
22	1	65	9	65	1.25	R/W	Harness, Main	Trailer Coupler	
23			6	65B	0.85	R/W	65-65	Harness, Cabin	
24	1	66	11	66	0.5	Br	Harness, Main	Harness, LH Rear	
25	1	79	9	79	0.85	G/B	Harness, Main	Trailer Coupler	
26			11	79A	0.5	G/B	79-79	Harness, LH Rear	
27	1	88	9	88	0.85	G/Y	Harness, Main	Trailer Coupler	
28			2	88A	0.5	G/Y	88-88	Combination Lamp(R)	
29			7	88B	0.5	G/Y	88-88	Winker(R)	
30	1	91	24	91	0.5	R	Harness, Main	F Pedal Potentiometer	Power 5V
31			27	91A	0.5	R	91-91	R Pedal Potentiometer	
32	1	96	9	96	0.85	W/L	Harness, Main	Trailer Coupler	
33			11	96A	0.5	W/L	96-96	Harness, LH Rear	
34			8	96B	0.5	W/L	96-96	Taillight, Stop Lamp(R)	
35	1	97	24	97	0.85	B	Harness, Main	F Pedal Potentiometer	Analog
36			27	97A	0.85	B	97-97	R Pedal Potentiometer	Earth
37	1	101			3	R	Harness, Main	101-101	
38			1	101A	1.25	R	101-101	Harness, Main	
39			6	101B	2	R	101-101	Harness, Cabin	
40			6	101C	2	R	101-101	Harness, Cabin	
41	1	102	3	102	0.85	Br	Harness, Main	PTO Valve	
42	1	103	10	103	0.5	L/Y	Harness, Main	Position Lever S/W	
43	11	104	6	104	0.5	R/W	Harness, LH Rear	Harness, Cabin	
44	1	120	6	120	1.25	G/Y	Harness, Main	Harness, Cabin	
45	1	133	24	133	0.5	W/R	Harness, Main	F Pedal Potentiometer	Forward Signal
46	1	134	27	134	0.5	W/L	Harness, Main	R Pedal Potentiometer	Reverse Signal
47	1	135	23	135	0.5	W/G	Harness, Main	Ground Speed Sensor	
48	11	158	6	158	0.5	O	Harness, LH Rear	Harness, Cabin	

4) WIRING **(Cabin Harness) – 2655 SH**

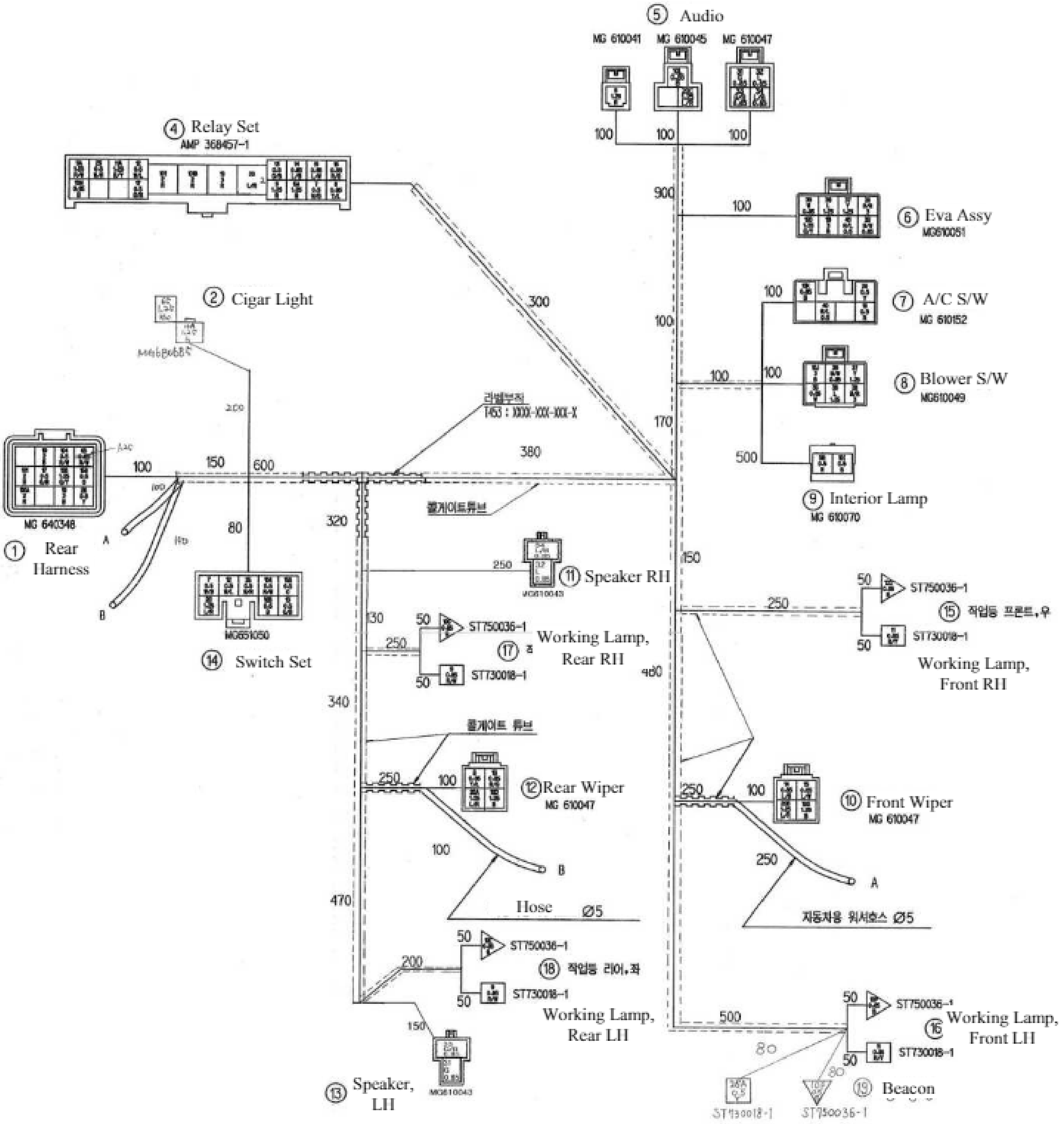


Fig.10-45

WIRING (**Cabin Harness) – 2655 SH**

No	Term.	Pin	Term.	Pin	Size(㎟)	Color	Description A	Description B	Remarks
1	5	5	4	5	1.25	R	Audio	Relay Set	
2			4	5A	1.25	R	5-5	Relay Set	
3			9	5B	0.5	R	5-5	Interior Lamp	
4	14	7	4	7	0.5	W/B	Switch Set	Relay Set	
5	12	8	4	8	0.85	Y/L	Rear Wiper	Relay Set	
6	17	9	18	9	0.85	R/W	Working Lamp, Rear RH	Working Lamp, Rear LH	
7			4	9A	1.25	R/W	9-9	Relay Set	
8	1	10	1	10	2	B	Harness, Rear	Harness, Rear	
9			2	10A	1.25	B	10-10	Cigar Light	
10			14	10B	0.5	B	10-10	Switch Set	
11			17	10C	0.85	B	10-10	Working Lamp, Rear RH	
12			12	10D	1.25	B	10-10	Rear Wiper	
13			18	10E	0.85	B	10-10	Working Lamp, Rear LH	
14			10	10G	1.25	B	10-10	Front Wiper	
15			9	10I	0.5	B	10-10	Interior Lamp	
16			8	10J	3	B	10-10	Blower S/W	
17			7	10X	0.85	B	10-10	A/C S/W	
18			5	10L	0.85	B	10-10	Audio	
19			4	10M	0.85	B	10-10	Relay Set	
20			15	10Q	0.85	B	10-10	Working Lamp, Front RH	
21			16	10P	0.85	B	10-10	Working Lamp, Front LH	
22	15	11	16	11	0.85	R/Y	Working Lamp, Front RH	Working Lamp, Front LH	
23			4	11A	1.25	R/Y	11-11	Relay Set	
24	14	12	4	12	0.5	W/L	Switch Set	Relay Set	
25	14	13	4	13	0.5	G/B	Switch Set	Relay Set	
26	10	14	4	14	0.85	L/B	Front Wiper	Relay Set	
27	10	15	4	15	0.85	L/W	Front Wiper	Relay Set	
28	12	16	4	16	0.85	R/G	Rear Wiper	Relay Set	
29	1	17	4	17	0.5	G/R	Harness, Rear	Relay Set	
30	4	19	6	19	3	R	Relay Set	Eva Assy	
31			7	19A	0.5	R	19-19	A/C S/W	
32			14	20	1.25	L/R	20-20	Switch Set	
33			12	20A	1.25	L/R	20-20	Rear Wiper	
34			10	20B	1.25	L/R	20-20	Front Wiper	
35			5	20C	1.25	L/R	20-20	Audio	
36			4	20D	2	L/R	20-20	Relay Set	
37	2	25	4	25	0.5	W/R	Switch Set	Relay Set	
38	1	26	7	26	0.5	Y	Harness, Rear	A/C S/W	
39	13	31	5	31	0.85	G	Speaker, LH	Audio	
40	11	32	5	32	0.85	L	Speaker, RH	Audio	
41	13	33	5	33	0.85	G/B	Speaker, LH	Audio	

WIRING **(Cabin Harness) – 2655 SH**

No	Term.	Pin	Term.	Pin	Size(㎟)	Color	Description A	Description B	Remarks
42	11	34	5	34	0.85	L/B	Speaker, RH	Audio	
43	8	35	6	35	0.85	W	Blower S/W	Eva. Assy	
44	8	36	6	36	1.25	L	Blower S/W	Eva. Assy	
45	8	37	6	37	1.25	Y	Blower S/W	Eva. Assy	
46	8	38	6	38	3	B/R	Blower S/W	Eva. Assy	
47	8	39	6	39	0.85	B/W	Blower S/W	Eva. Assy	
48	7	40	6	40	0.5	R/L	A/C S/W	Eva. Assy	
49	1	65	2	65	1.25	R/W	Harness, Rear	Cigar Light	
50	1	101	4	101	2	R	Harness, Rear	Relay Set	
51			1	101A	2	R	101-101	Harness, Rear	
52			4	101B	2	R	101-101	Relay Set	
53	1	104	2	104	0.5	R/W	Harness, Rear	Switch Set	
54	1	120	6	120	1.25	G/Y	Harness, Rear	Eva. Assy	
55	1	15B	14	15B	0.5	O	Harness, Rear	Switch Set	
56			19	26A	0.5	Y	26-26	Beacon	
57			19	10F	0.5	B	10-10	Beacon	

SECTION 7. TROUBLESHOOTING

Important: Whenever effecting a repair the reason for the cause of the problem must be investigated and corrected to avoid repeating failure.
The following table lists problems and their possible causes with the recommended remedial action

1. LIGHTING SYSTEM

Problems	Causes	Countermeasures
Several or all lights do not illuminate	Discharged battery	Check battery and charge or renew
	Loose or defective battery cable connection	Inspect, clean, and tighten connection
	Loose wire harness connectors	Check and ensure connectors securely engaged
	Burnt out fuse or fusible link	Inspect and renew. Check circuit before re-connecting power
	Faulty wiring	Check lighting Circuit wiring and repair or renew
	Defective light switch	Check and renew
	Several light bulbs burnt out due to defective voltage regulation	Check and renew voltage regulator (Alternator)
Individual lights do not illuminate	Burnt out bulb	Check and renew
	Defective or corroded bulb contact	Inspect, clean or renew
	Burnt out fuse	Inspect and renew. Check circuit before reconnecting power
	Loose or broken wires	Inspect ,secure, repair, or renew wiring
	Poor ground connection	Inspect, clean, and tighten ground connection
Lights burnt out repeatedly	Faulty voltage regulator	Check and renew voltage regulator (Alternator)
Turn signal lights do not illuminate	Blown fuse	Inspect and renew. Check circuit before re-connecting power
	Inoperative flasher unit	Check and renew
	Inoperative turn signal switch	Check and renew
	Defective wiring or connections	Inspect circuit, clean, and tighten connection. Repair or renew wiring if necessary

Problems	Causes	Countermeasures
Individual turn signal light does not illuminate	Burnt out bulb	Check and renew
	Corroded or loose bulb contacts	Inspect, clean, and renew
	Poor ground connection or damage wiring	Inspect, clean, and tighten connections or renew wiring
Turn signal pilot light is inoperative	Faulty bulb	Check and renew
	Defective flasher unit	Check and renew
	Faulty wiring or connections	Inspect, clean, and tighten connections or renew wiring
Stop lights does not illuminate	Inoperative stop light switch	Check and renew
	See "Individual lights do not illuminate"	See "Individual lights do not illuminate
Inoperative work light	Work light switch is not turned on	Ensure work light illuminates
	See "Individual lights do not illuminate	See "Individual lights do not illuminate

2. INSTRUMENTATION

Problems	Causes	Countermeasures
Inoperative or erratic meters	Loose or broken wiring	Inspect Circuit, tighten connections or renew wiring
	Defective meters	Inspect and renew
	Defective sensors	Check and renew
	Defective Voltage regulator	Check and renew voltage regulator (Alternator)
Monitor light does not illuminate	Loose or broken wiring	Inspect circuit, tighten connections or renew wiring
	Faulty main switch	Check and renew
	Burnt out bulb	Check and renew
	Burnt out fuse	Check and renew
	Defective switch	Check and renew
	Loose or broken wiring	Check and renew
PTO does not operate	Burnt out fuse	Inspect and renew. Check circuit
	Loose or broken wires or connections	Inspect circuit, tighten connections, or renew wiring
	Defective PTO switch	Check and renew
	Defective PTO solenoid	Check and renew

Problems	Causes	Countermeasures
Inoperative horn	Burnt out fuse	Inspect and renew. Check circuit before re-connecting power
	Loose or broken wires of connections	Inspect circuit, tighten connections, or renew wiring
	Defective horn switch	Check and renew
	Defective horn	Check and renew

3.GLOW SYSTEM

Problems	Causes	Countermeasures
All glow plugs do not heat red	Discharged Battery	Check battery and charge or renew
	Loose or defective battery cable connections	Inspect, clean, and tighten connections
	Loose wire harness connections	Check and ensure connectors securely engaged
	Burnt out fusible link	Inspect and renew. Check circuit before re-connecting power
	Faulty wiring	Check glow plug circuit wiring and repair or renew
	Defective main switch	Check and renew
Individual glow plug does not glow	Defective glow plug	Check and renew
	Defective or corroded glow plug contacts	Inspect, Clean, or renew
	Loose or broken wires	Inspect, secure, repair, or renew wiring
Glow monitor light does not illuminate	Defective controller	Check and renew
	Defective glow monitor light or monitor and warning check unit	See ”Light system troubleshooting”

4. STARTING SYSTEM

Problems	Causes	Countermeasures
Starter motor does not spin	Discharged battery	Check battery and charge or renew
	Defective stop light switch	Check and renew
	Defective key switch	Check and renew
	Defective starter motor connections or loose battery connections	Check, clean and tighten connections
	Faulty starter motor	Inspect, repair, or renew
	Defective master brake pedal	Inspect and try to push brake pedal
	Faulty reverse or forward pedal	Inspect ,adjust neutral
	Defective push switch	Check and renew
	Defective controller	Check and renew
Engine cranks slowly	Discharged battery	Check battery and charge or renew
	Excessive resistance in starter circuit	Check circuit connections and repair or renew faulty wiring
	Defective starter motor	Refer to the engine manual
	Tight engine	Refer to the engine manual

5. CHARGING SYSTEM

Problems	Causes	Countermeasures
Battery is low in charge or discharge	Loose or worn alternator drive belt	Check and adjust belt tension or renew
	Defective battery : It will not accept or hold charge. Electrolyte level is low	Check condition of battery and renew
	Excessive resistance due to loose charging system connections	Check, clean, and tighten circuit connections
	Defective alternator	Check and repair or renew
Alternator is charging at high rate (Battery is overheating)	Defective battery	Check condition of battery and renew
	Defective Alternator	Check and repair or renew
No output from alternator	Alternator drive belt is broken	Renew and tension correctly
	Loose connection or broken cable in charge system	Inspect system, tighten connections and repair or renew faulty wiring
	Defective voltage regulator	Check and renew
	Defective alternator	Check and repair or renew

Problems	Causes	Countermeasures
Intermittent or low alternator output	Alternator drive belt is slipping	Check and adjust belt tension or renew
	Loose connection or broken cable in charge system	Inspect system, tighten connections and repair or renew faulty wiring
	Defective alternator	Check and repair or renew
Warning light dims	Faulty external charging circuit connections	Inspect system, clean and tighten connections
	Faulty rotor slip rings or brushes	Inspect and repair or renew
	Defective monitor and warning unit	Check and renew
	Faulty rectifier or rectifying diodes	Check and renew
Warning light is normal but battery is discharged	Defective voltage regulator	Check and renew
	Faulty starter	Check and renew
	Faulty rectifier or rectifying diodes	Check and renew
Warning light is lit during operation	Loose or worn alternator drive belt	Check and adjust tension or renew
	Defective diodes	Check and renew
	Faulty rotor,slip rings, or brushes	Inspect, repair,or renew
	Defective starter	Check and renew
	Defective rectifier or rectifying diodes	Check and renew
Warning light flashes intermittently	Faulty external charging circuit	Inspect circuit, clean, and tighten connections. Repair or renew faulty wiring
	Alternator's internal connections	Inspect and test circuitry, Repair or renew

CHAPTER 11
CABIN

SECTION 1. GENERAL DESCRIPTION ----------------------------- 11-1

SECTION 2. INSTRUMENT AND RELATED PARTS ------- 11-2

SECTION 3. CONTROLS--- 11-3

SECTION 4. HEATING SYSTEM------------------------------------- 11-6

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SECTION 7. CABIN WIRING DIAGRAM------------------------- 11-23

CHAPTER 11. Cabin

SECTION 1. GENERAL DESCRIPTION

The cab fully conforms to the international standard as far as safety and soundproofing are concerned.

It can be provided with ventilation, heating and air-conditioning system.

It is available in the following version.:

- Cab with ventilation and heating systems
- Cab with ventilation, heating and air-conditioning systems.

⚠	The cab is in full conformity with the international standards as to the cab's soundproofing. Be very careful when operating in small spaces and always protect your ears whenever other working equipment is generating dangerous noise levels.

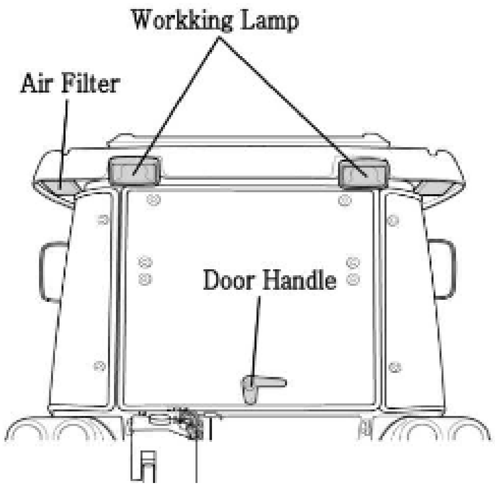


Fig.11-1 Rear side of Cabin

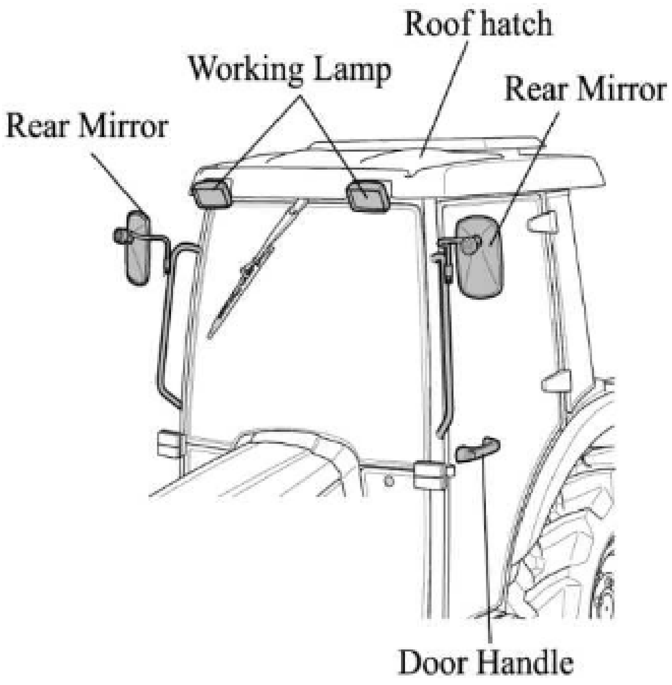


Fig.11-2 ISO view of Cabin

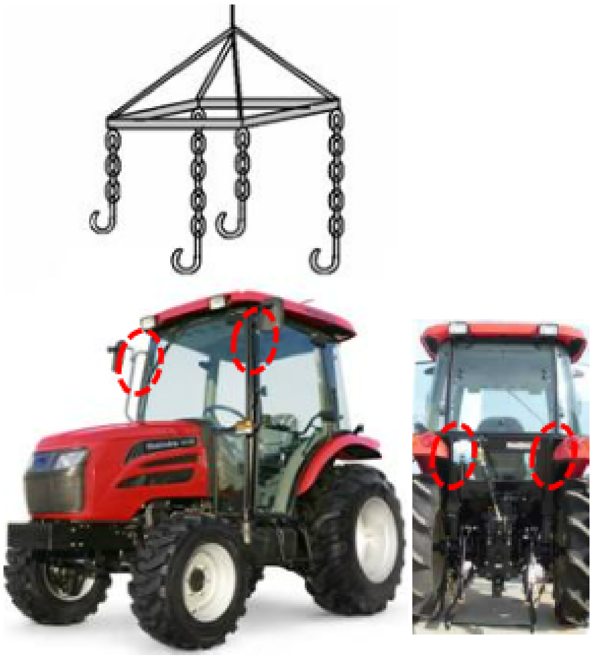


Fig.11-3 Remove the Cabin assembly.

Note :

Cabin can be Lifted up from transmission and gradually making sure that all relevant wiring. Piping, cock and links are disconnected.

⚠	Remember that steering, braking and operational performances are highly influenced by the implements mounted, the trailers transported and the ballasts applied to the tractor.

⚠	When transporting heavy loads (exceeding the weight of the tractor) reduce the speed under 15 Km/h..

⚠	All the implements mounted onto the tractor must be safely secured.

⚠	Be very careful during implement hitching and unhitching operations. When using implement supports, be sure they are suitable and sufficiently strong.

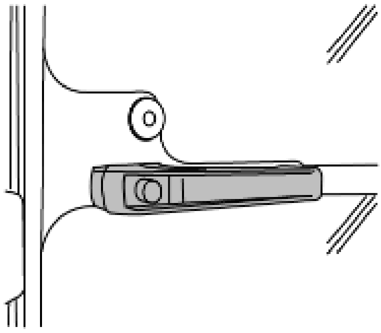
Section 2. INSTRUMENT AND RELATED PARTS

■ **Doors**:

The doors are provided with key locks.

To open from the outside, when unlocked, depress the push button.

To open from inside, push the lever downwards.



■ **Rear Window:**

The rear window is fitted with central handle for opening.

When opened it is held in place by two dampers.

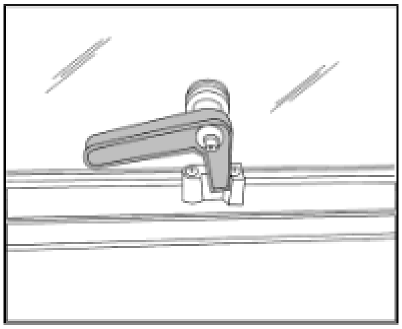


Fig.11-5

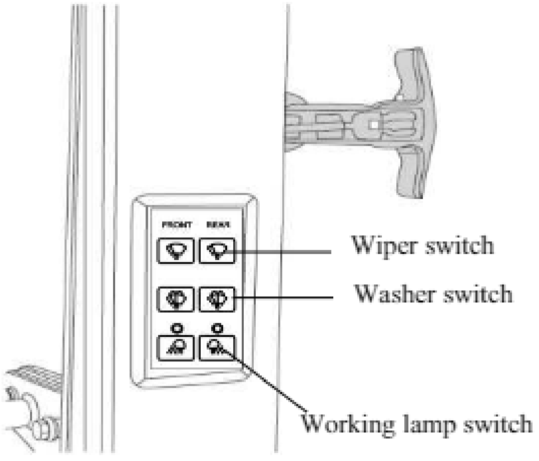


Fig.11-4 Windows and working lamp switch

■ **Side Window:**

The side window is fitted with central handle for opening.

When opened it is held in place by holder.

■ Working lamp switch is installed to right side frame and can be extracted as shown Left figure

■ **Working lamps (front and rear) :**

The working lamps are located on the cab roof (two in the front and two in the rear) .They are switched on by means of the special switches on the roof console

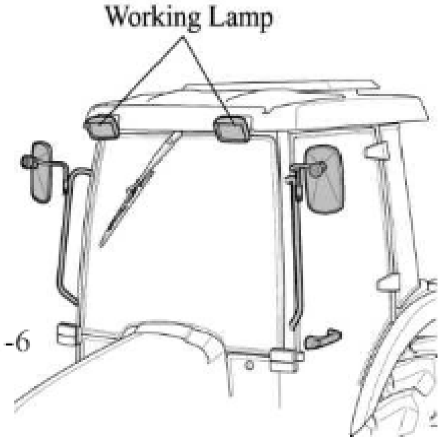


Fig.11-6

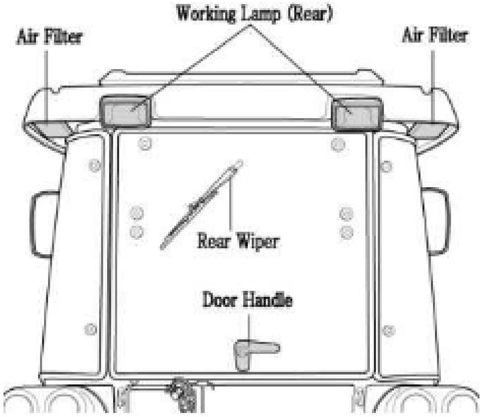


Fig.11-7

■ **Rearview mirrors**.:

The cab is provided with rearview mirrors on both sides. They can be adjusted and folded, whenever necessary, to avoid interference with external obstacles.

The mirror have a telescopic arm to allow positioning for maximum convenience by the user.

Remember that mirrors must always be positioned in compliance with road traffic regulations when driving on a public highway.

■ **Cab ceiling:**

The ceiling is padded with insulation material to block heat radiation into the cab and keep the temperature down when working in very sunny areas.

The cab platform is covered with a “firm grip” carpet in the most commonly used areas.

It is recommended to keep this carpet clear of earth, mud, etc. so that the operator may get on and off the tractor in full safety.

Section

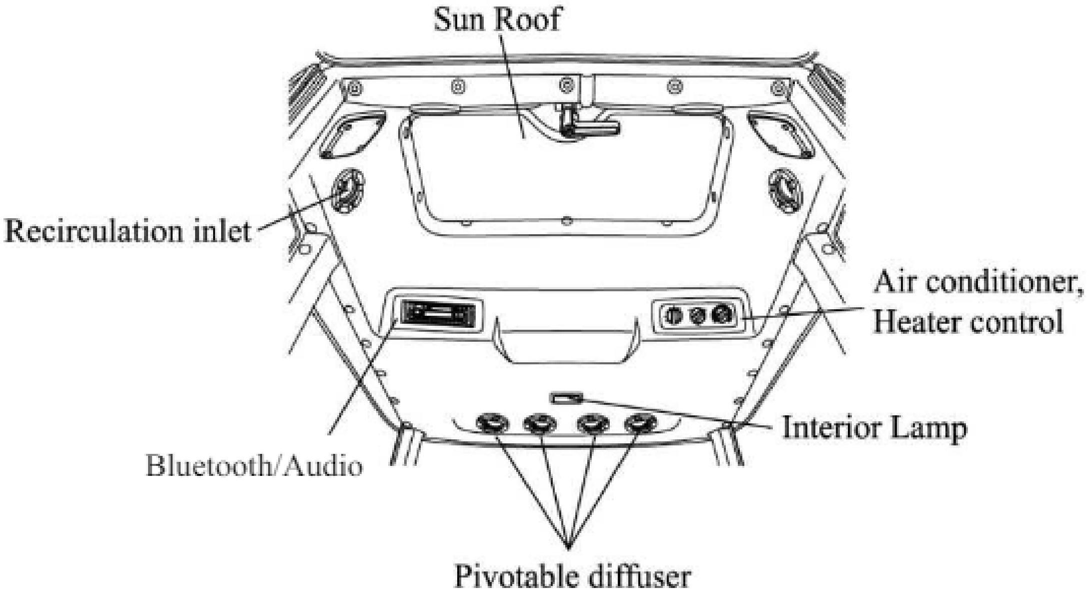


Fig.11-8 Cabin interior

VENTILATION

The ventilation unit is housed in the cab ceiling.

To switch it on and adjust it, turn the electrical fan switch to the desired speed.

The cab becomes slightly pressurized when the ventilation system is in operation, so that the fresh air can enter only by way of the filter installed in the rear section of the cab roof.

The fan switch can be operated only after the ignition key is inserted.

The air flow can be regulated and directed by suitable positioning the air diffusers.

Air can be taken in fresh from outside or recirculated from within the cab by way of the relative side inlets

■ **Re-circulation inlets fully closed**:

Air is taken in entirely from outside the cab through the rear grille and filtered through a paper element positioned behind the grille.

N.B-it is very important that the air diffusers never be completed closed so as to allow for a steady air flow.

To obtain a greater pressurization inside the cab, it is necessary to take the air from the outside, therefore the inside air recirculatiing grille should be fully closed.

■ Working lamp switch

The front and rear working lights are ON when push the button. The work light indicator lamp on the instrument cluster will illuminate.

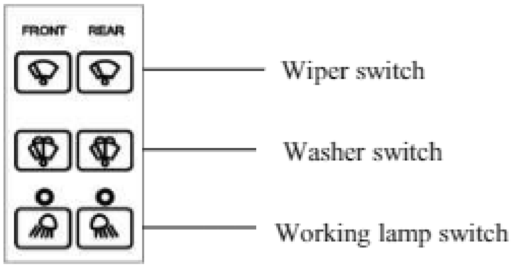


Fig.11-9

■ Wiper control switch

- Switch ON

The Wiper switch is ON when Push the Top button.

The Washer switch is ON when Push the Mid-button.

- Switch OFF

Once again push the buttons.

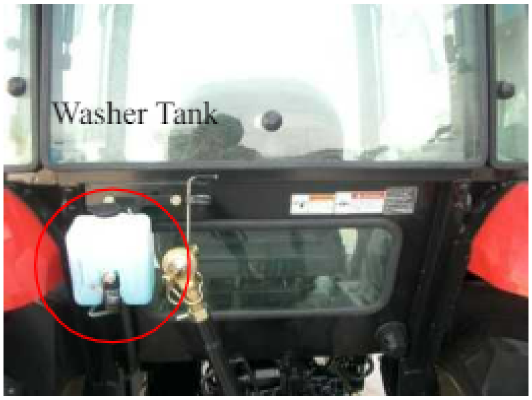


Fig.11-10

■ Windscreen Washer tank

Check the level of windscreen washer fluid in the plastic reservoir located at the front of the radiator During winter, it is advisable to add a suitable antifreeze or methyl alcohol to the windscreen washer fluid.

■ Interior Lamp

Push the button to light on

And push it again to light off

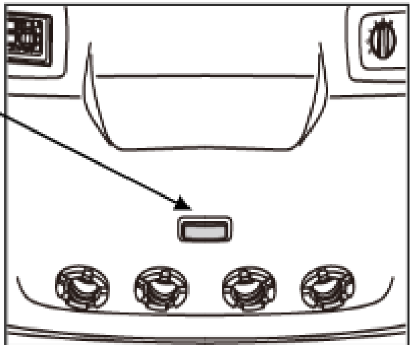


Fig.11-11

■ Blower control switch

Three position rocker switch

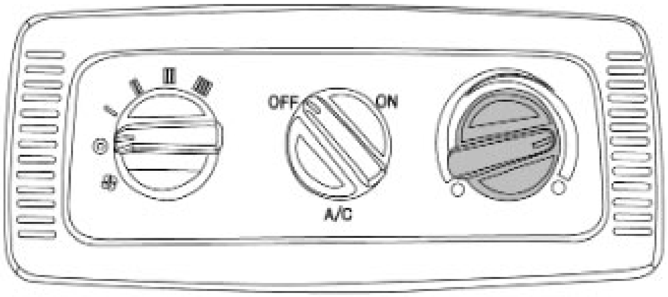
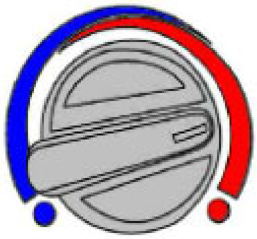


Fig.11-12 Blower control Switch

■ Temperature control

Set temperature control as required, fully clockwise For maximum cool and fully counterclockwise for heat.



Temperature control

Fig.11-13

■ Air conditioning switch

To operate the air conditioner, the blower must be on. The blower speed temperature control and all vents must be adjusted to obtain the best cooling for the ambient temperature and dust conditions.

Under normal operating conditions, and the windows and doors closed, temperatures in the cab of 6ºC to 15 ºC (10 ºF to 25 ºF) less than the ambient temperature will occur.

When operating the air conditioner system, the moisture level is decreased.

NOTE:

1) During cold weather, with ambient temperature above 0 ºC (32 ºF) operate the air conditioner at least once per month, for a period of 10 to 15 minutes. This will lubricate the seals to prevent them becoming brittle and help prevent the loss of refrigerant from the system.

2) The system is equipped with an environmentally safe refrigerant,R134a.Never recharge the air conditioning system with refrigerant other than R134a as this will result in loss of cooling and permanent damage to all air conditioning components

■ Circulation diffuser

With the circulation vent set in any position outside Air will still be pulled into the cab.

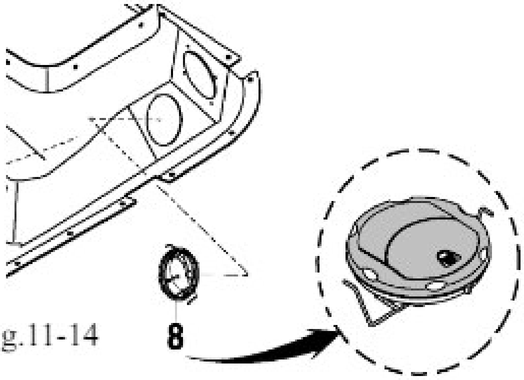


Fig.11-14

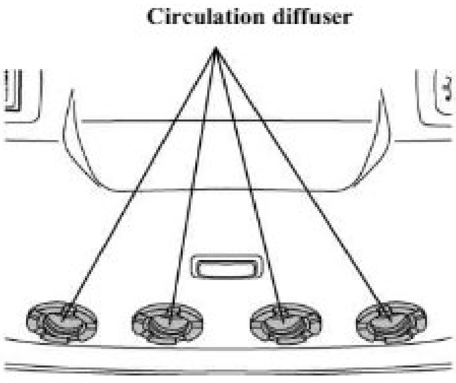


Fig.11-15 circulation diffuser

SECTION 4 HEATING SYSTEM

General description

The heater is switched on and adjusted by rotating the control knob at the roof console, then switching on the blower and setting the selector at the preferred speed .

To warn the cab up quickly, the knob should be rotated fully clockwise and the blower set to speed 3.

The screen is demisted or defrosted by air directed through a slot vent . For defrost or fast demist, all other vents should be closed off.

IMPORTANT:

Ventilation is provided by a single blower unit serving both the heating system and the air conditioning system.

After reaching the desired temperature adjust the system to suit your needs.

NOTE:

-For ideal system operation, the engine must run at 1000 rpm

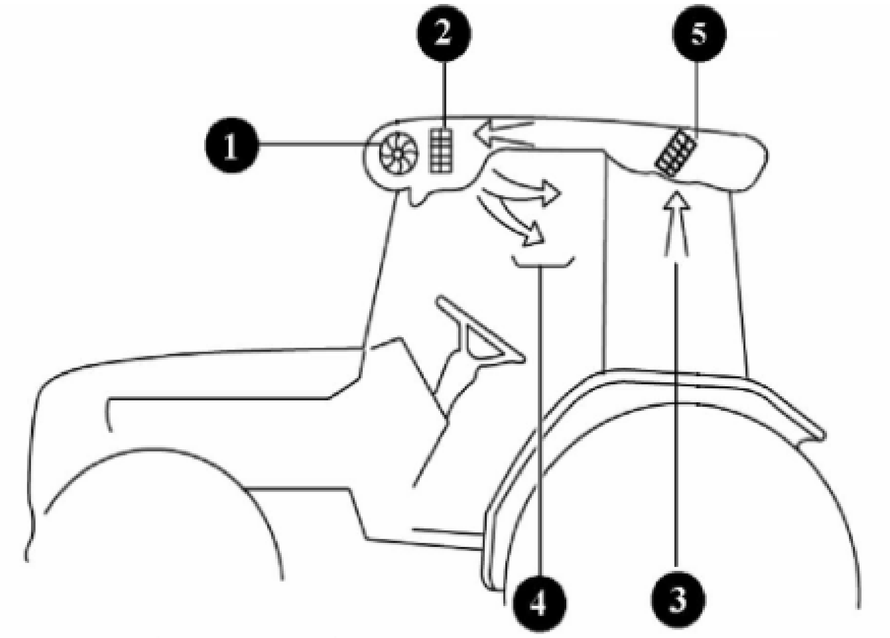


Fig.11-16 Heating System

1. Speed heating fan 2.Electric resistances 3.Recirculation inlets 4.Pivotal air diffuser 5.Air filter

⚠ Warning	Before starting the engine, make sure the system is off (by turning off the ventilation fan) so as not to overload the battery. After the system at full power for a long period of time, never turn it off suddenly but let it first idle for about 20 seconds.

SYSTEM CONFIGULATION

1.The heating system consist of two units:

1-Electric heater and blower unit installed behind roof console.

2-Power supplying set, consisting of an auxiliary alternator located front of the engine and driven by a belt directly linked to the engine pulley.

If the air does not come out from the diffusers right away as soon as the system is started, turn off immediately and identify the fault.

N.B-Never turn on the heating system when working in dusty environments.

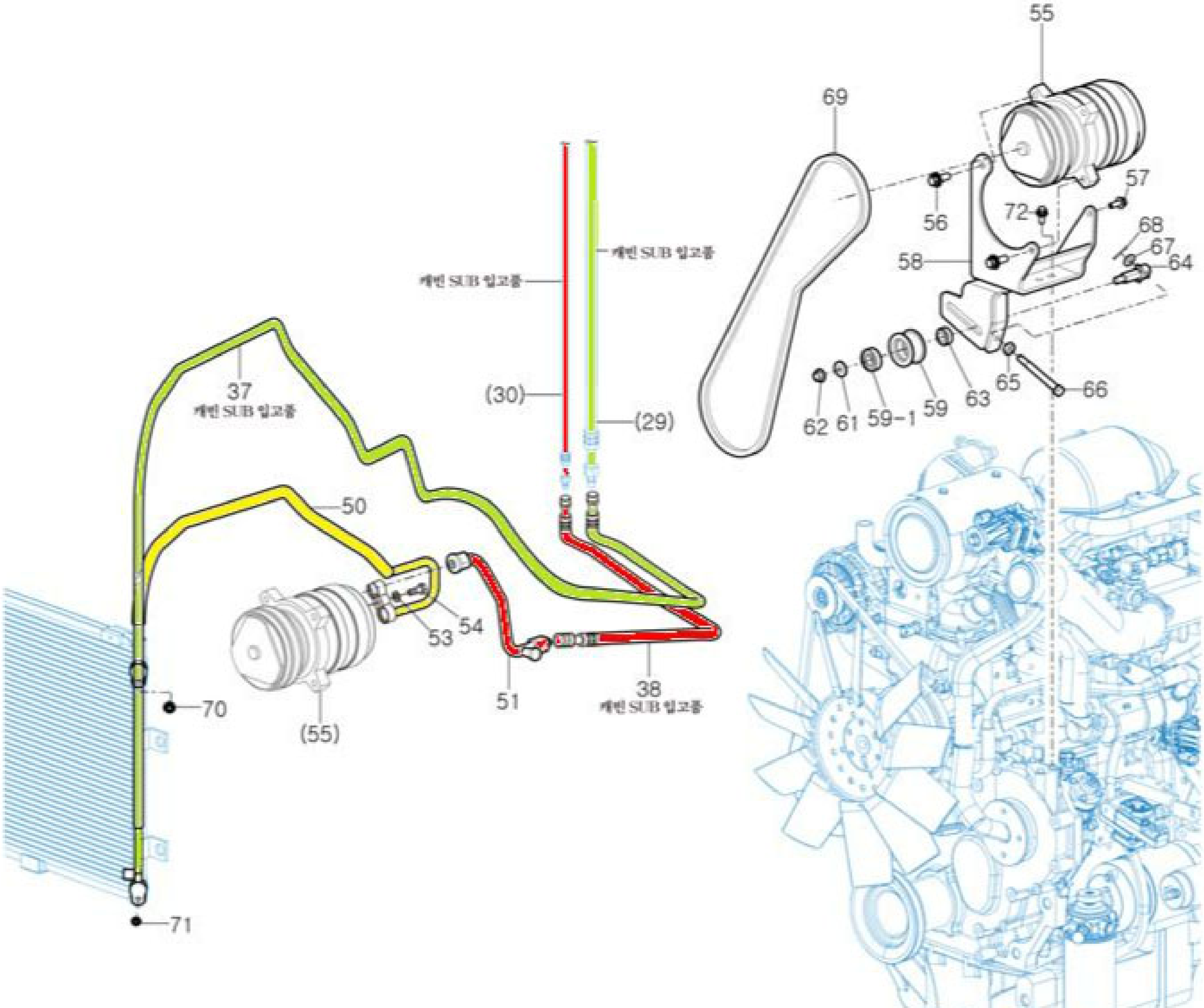


Fig.11-17 compressor and related parts

■ **Compressor belt adjustment**

Check the compressor belt tension regularly and adjust If required.

The correct tension is if the center of the belt is Pushed With a finger it moves in approx. 10 mm (0.39 in) as shown in the picture.

To adjust the belt, loosen or tighten the nut as shown in the picture.

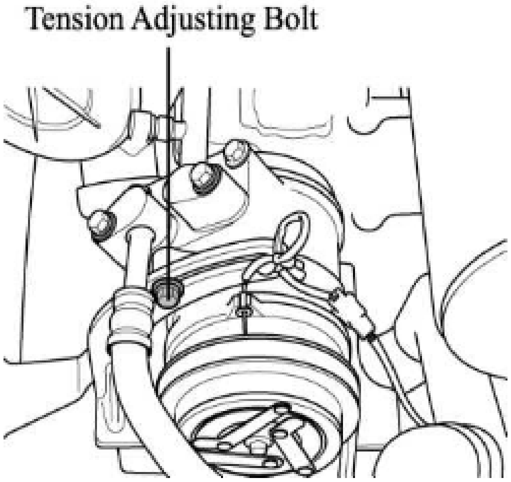


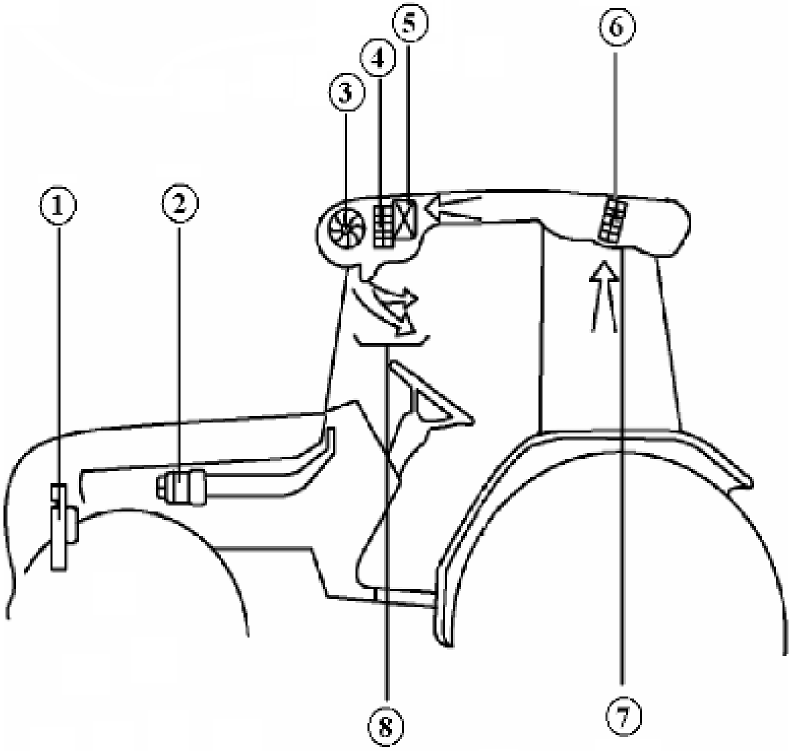
Fig.11-18

SECTION 5. AIR CONDITIONING SYSTEM

The system is designed to ensure optimum temperature inside the cab and maximum comfort and safety for the operator.

However, it is advisable to consult our specialized workshops whenever repairs or adjustments need to be performed.

Do not approach the system with open flames, as any escape from the circuit may produce a lethal gas.



1.Alternator	2.Compressor	3.Speed fan	4.Electric resistance
5.Evaporator	6.Air filter	7.Recirculation inlets	8.Pivotal air diffusers

Fig.11-19 Air Conditioning System

AIR CONDITIONING SYSTEM

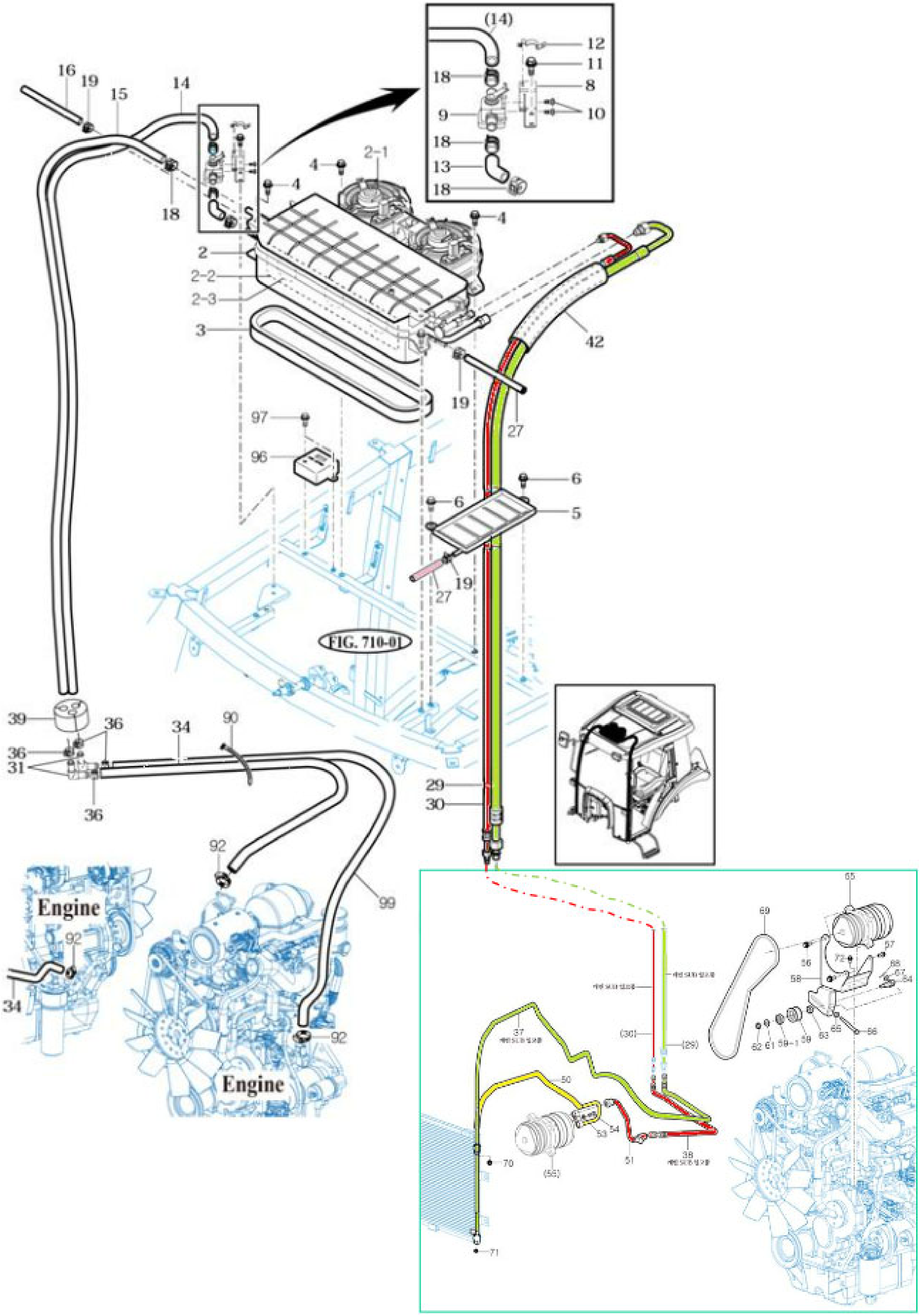


Fig.11-20 Air conditioning system and related parts

■ Roof hatch

Ventilation-push the latch towards the front of the tractor and then push the hatch up.

Emergency Exit-Push firmly upwards to release the su struts from the lower retainer clips.

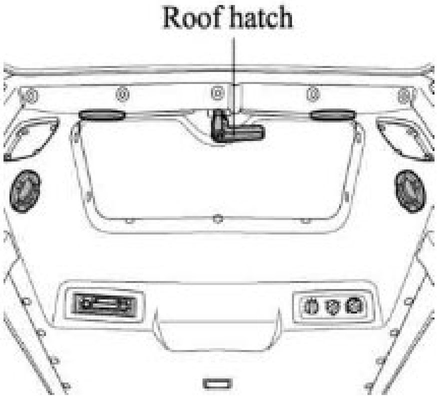


Fig.11-21

■ Cab Air intake filter

The《Paper》 filter is not suitable for the treatment of pesticides

and so must be replaced by an

ACTIVE CARBON》FILTER

available optionally. Once the pesticide

treatment is finished, it is necessary to once

again replace the "ACTIVE CARBON"

filter with the paper filter, since this is the

only type suited for filtering foreign

particles from the air.

Optional ACTIVE CARBONFILTER is

informed to parts Catalogue

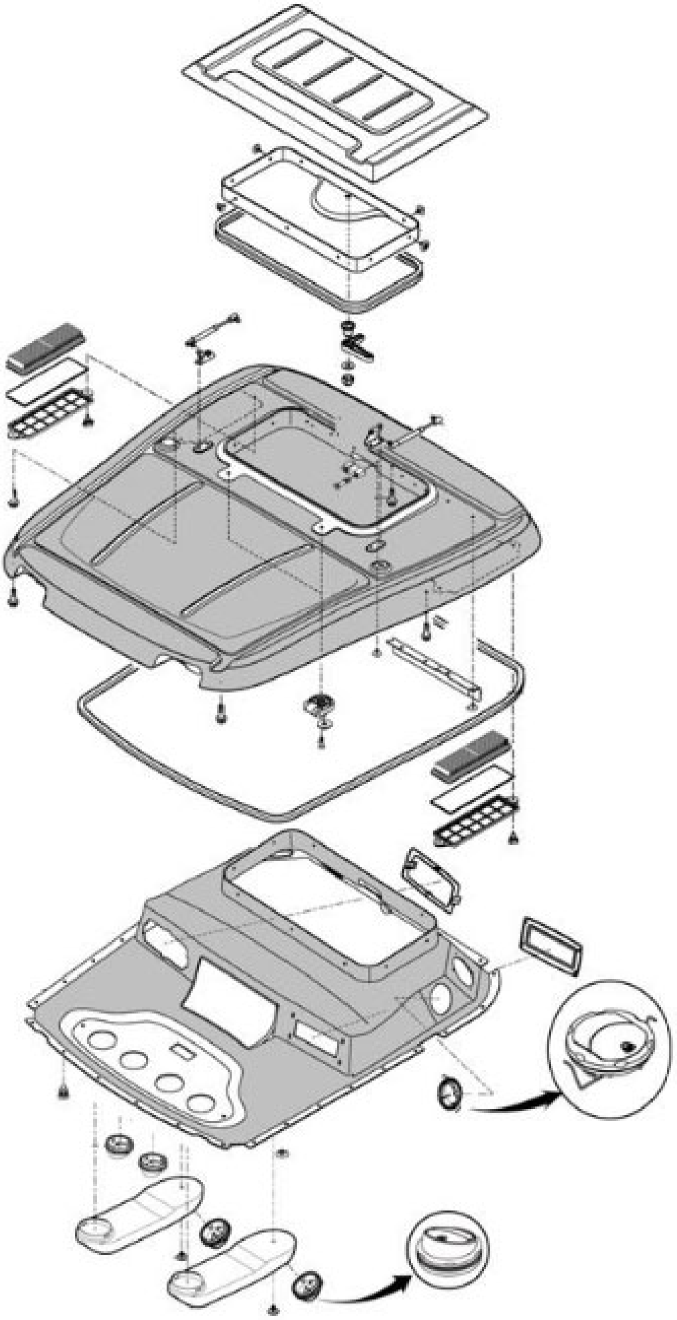


Fig.11-22

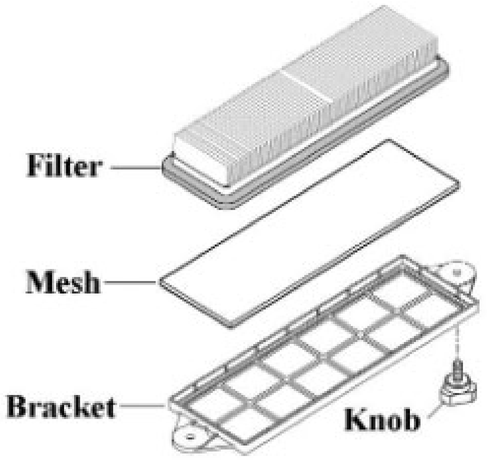
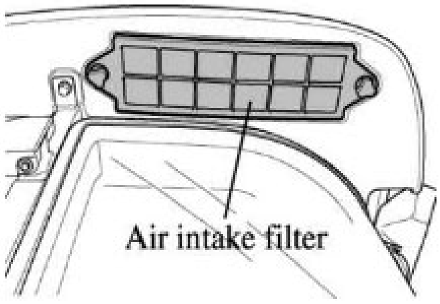


Fig.11-23 Air filter



■ At Regular intervals

(According to the operating conditions): clean filter(16 fig.11-12).To gain access to the filter it is necessary to loosen the two knobs fixing the side grill and the filter support, then remove the filter.

Filter cleaning is performed as follows:

1. Direct a jet of compressed air (Max.6 bar) in the direction opposite to that of the filtering action until the dust is completely removed.
2. Do not wash with a water and or detergent solution because this element filter is basically paper.

⚠ Warning	Cab air filters remove dust in the air, but are not capable of removing chemicals used in spraying crops or in weed control. Many chemicals used for these purposes are toxic when improperly used. and can be hazardous to operators and others in the area. Follow the instructions of manufacturers of both the equipment and the chemicals regarding prohibition of dust or spray, personal hygiene practices, and other precautions noted by the manufacturers.

■ Radio, Bluetooth audio

Located into the top of the cabin,

And it can be extracted by removing fixing bolts in the cabin

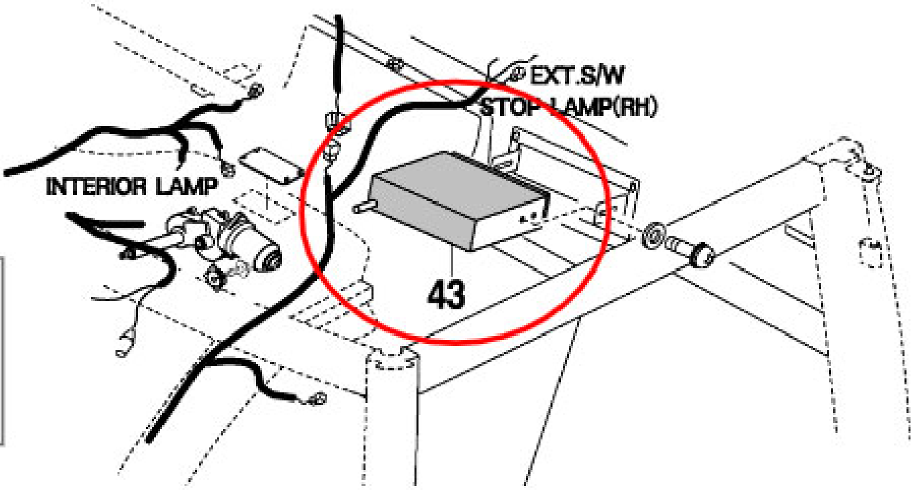


Fig.11-24 Radio, Bluetooth audio

■ Power socket

It is possible to use a 12-V 120-W accessory by connecting it to the power socket.

■ Cup Holder

For bottles and personal belongings.

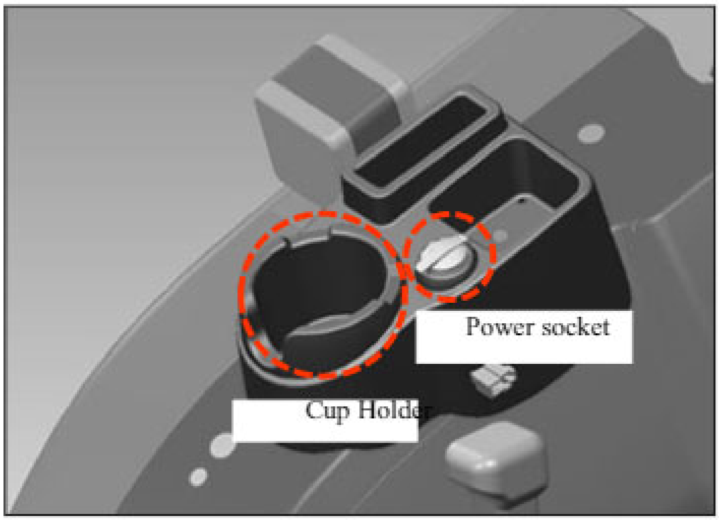


Fig.11-25

1.SAFETY PROCEDURES.

Warning	This safety alert symbol indicates important safety messages in this manual. when you see this symbol, carefully read the message that follows and be alert to the possibility of personal injury or death

Refrigerant R134a is the most stable and easiest to work with refrigerants now in use in air conditioner systems. Refrigerant R134a does not contain any chlorofluorocarbons (CFC's) which are harmful to the earth's ozone layer.

Safety procedures must be followed when working with Refrigerant R134a to prevent possible personal injury.

1.Always wear safety goggles when doing any service work near an air conditioner system. Liquid refrigerant getting into the eyes can cause serious injury. Do the following if you get refrigerant near or in your eyes.

A. Flush your eyes with water for 15 minutes.

B. See a physician immediately.

2. A drop of liquid refrigerant on your skin will cause frostbite. Open the fittings carefully and slowly when it is necessary to service the air conditioner system. Your skin must be treated for frostbite or a physician must be seen if you get refrigerant on your skin.

3.Keep refrigerant containers in the correct upright position. Always keep refrigerant containers away from heat or sunlight. The pressure in a container will increase with heat.

4.Always reclaim refrigerant from the system, if you are going to weld or steam clean near the air conditioner system.

5.Always check the temperature and pressure of the air conditioner system before reclaiming the refrigerant and when you test the system.

6.Never leak test the system using a flame tester. Dangerous gas can form when refrigerant comes in contact with an open flame. Never permit fumes to be inhaled.

7. Never leak or pressure test the system with compressed air or oxygen. Refrigerant R134a in the presence of air or oxygen above atmospheric pressure can form a combustible gas.

Caution	Never operate the engine in a closed building. Proper ventilation is required under all circumstances.

Caution	Never touch liquid refrigerant, since even a small drop on your skin will cause severe and painful frostbite. Always wear protective gloves.

Caution	Always wear safety goggles when working with liquid refrigerant. Liquid refrigerant in your eyes could cause blindness.

Caution	DO NOT use steam to clean any air conditioner system parts while the system is charged. The heat may cause the refrigerant to rise in pressure that can cause the system to explode

2. OPERATION

The air conditioner system contains five major components: Compressor, receiver drier, expansion valve and evaporator. These components are connected by tubes and hoses and operate as a closed system. The air conditioner system is charged with R-134a refrigerant..

The compressor receives the refrigerant as a low pressure gas. The compressor then compresses the refrigerant and sends it in the form of a high-pressure high temperature gas to the condenser. The airflow through the condenser then removes the heat from the refrigerant. As the heat is removed the refrigerant changes to the high-pressure liquid.

The high-pressure refrigerant liquid then flows from the condenser to the receiver drier. The receiver drier is a container filled with moisture removing material, which removes any moisture that may have entered the air conditioner system in order to prevent corrosion of the internal components of the system.

The refrigerant still in a high pressure liquid form, then flows from the receiver drier to the expansion valve then causes a restriction in flow of refrigerant to the evaporator core, lowering the pressure of the liquid.

As the refrigerant flows through the evaporator core the refrigerant is heated by the air around and flowing through the evaporator fins. The combination of increased heat and decreased pressure causes the refrigerant to evaporate an d form a low pressure gas.

The evaporation causes the airflow through the evaporator fins to become very cool. The cool air then passes from the evaporator to the operators cab.

The low pressure refrigerant gas return to the compressor to repeat the cycle.

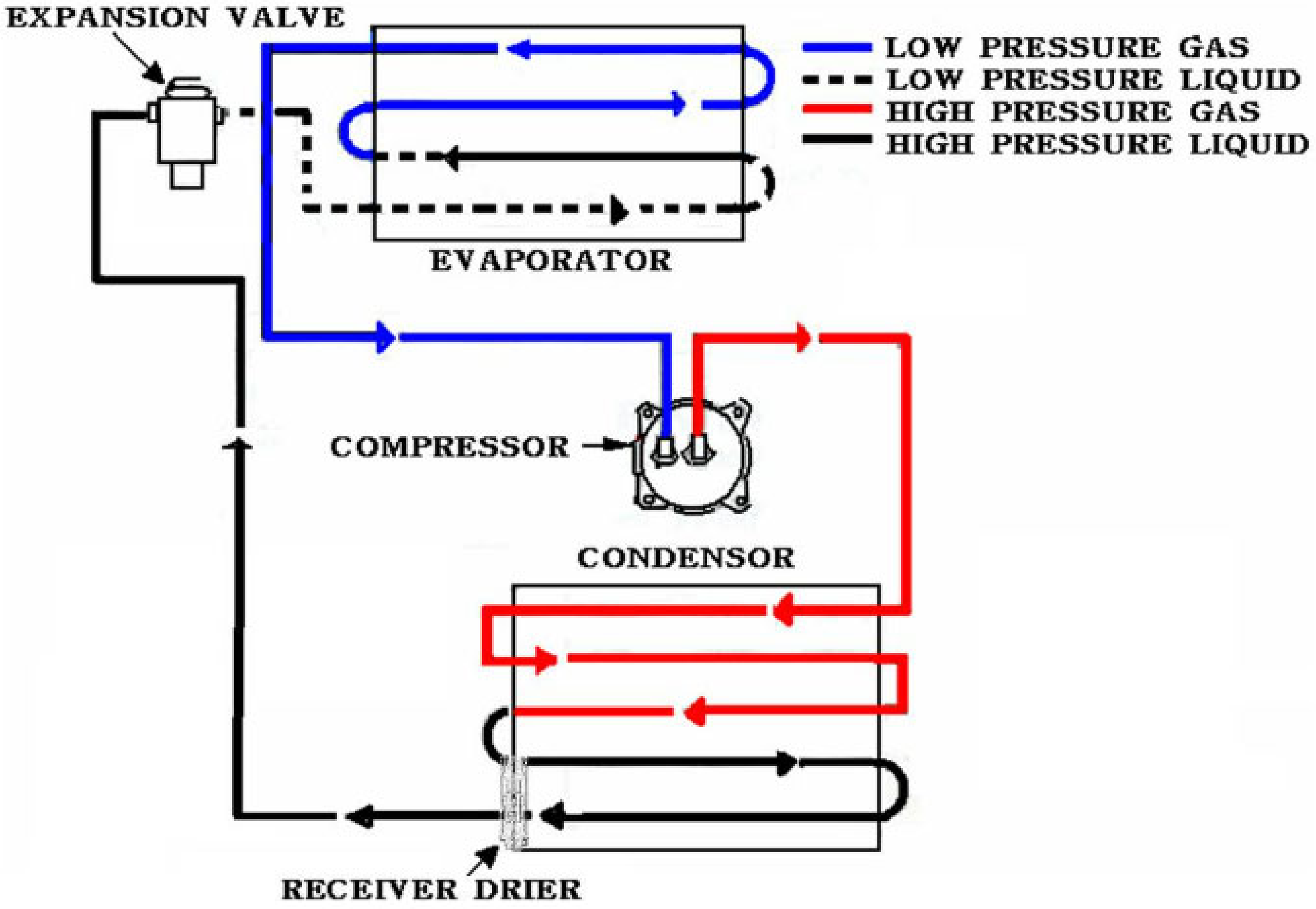


Fig.11-26

3. Checking the air conditioning system.

①Economic friendly refrigerant : R134a 0.7~0.85Kg.

The presence of air and water in the system could jeopardize its efficiency.

-The air is uselessly compressed by the compressor and no cooling effect is produced.

-The moisture has a tendency rise to obstructions which prevent the cooling efficiency.

② Check belt tension ; when finger pressure is applied to the mid-point between both pulleys.

③ Condenser fins must always be duly clean using water or an air set.

4. Checking the air conditioning system charge

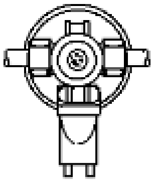
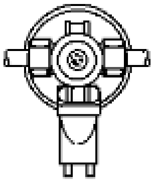
(1) Check the refrigerant charge.

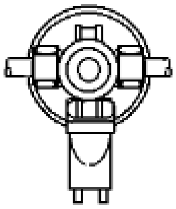
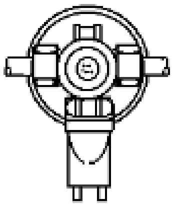
A. Run the engine at 1500rpm

B. Set the air conditioning system in the coldest for 5 minutes.

Caution	If the air-con. is operated with not charged. The lubrication in the compressor can cause the damage.

(2) Check the refrigerant with receive drier sight glass (If equipped)

	Bubbles or foam visible	Trouble shoot	
	● Bubbles flow and refrigerant gas disappeared like a fog flows	● Deficient of refrigerant Replenish ● Nothing different temperature between H.L pipe ● High pressure of the pressure gauge needle indicates low pressure	Abnormal
	●Same bubble appeared occasionally (1~2 sec. gap)	● Replenish the refrigerant ● High pressure pipe is hot and low pressure pipe is a little cool. ● H.L pressure of the pressure gauge needle indicates low pressure.	Abnormal

	Bubbles or foam visible	Trouble shoot	
	●No bubble shown High-pressure pipe is hot abnormally. H-L pressure of the pressure gauge needle indicates high pressure abnormally	●Too much of refrigerant deflate. ●High pressure pipe is not abnormal ● H.L pressure of the pressure gauge needle indicates high abnormally.	Abnormal
	● Refrigerant in the sight is shown clearly ● When engine RPM operates with high low some bubbles disappear slowly	● Normal refrigerant gas situation ● High pressure pipe is hot Low pressure pipe is cool ● High low pressure is normal with below. Low: 1.5~2.0kg/㎡ High: 14.5~15kg/㎡	normal

5.Diagnosing malfunctions.

(1) Tracing faults

	SYMPTOM	CONDITION	CAUSE	REMEDY
1.Compressor	Abnormal sound	Inlet sound Outlet sound	Insufficient Lub.	Replenish
			Belt tension release	Adjust
			Release the bracket	Tighten the bolts
			Clutch fail	Check
	Abnormal revolution	Inlet cause	Damaged parts	Check, replace
			Slip the clutch	Check, replace
			Not Lub.	Replenish
		Outlet cause	Belt tension released	Adjust
	Refrigerant or oil leakage	Refrigerant or oil leakage	Sealing washer damaged	replace
			Head bolt released	Tighten the bolts
			D-ring damaged	Replace
	Excessive pressure	Low, High pressure	Insufficient refrigerator	Adjust
			Compressor	Replace

	SYMPTOM	CONDITION	CAUSE	REMEDY
2.Motor	Weak from pressure or don't work	Motor is normal	Air inlet clogged	Remove
			Evaporator freezing	Controlling minimum pressure
			Ventilator switch damage	Replace the switch
			Compressor	Replace
		Motor is abnormal	Motor failure	Replace
			Wire cut	Replace
		Air leakage	Duct leakage	Check, tighten
	Unable to control the fan	Motor	Air volume control switch failure	Check, tighten
		Motor is abnormal	Motor failure	Replace
3. Clutch	Noise	Regular noise Irregular noise	Interference with pulley	Control the compressor direction
	Disengage	Engaged sometimes	Wire defect	Check wire
		Engaged to push with hand	Clutch gap large	Adjust
			Low voltage	Check battery
		No defect wire	malfunction	Replace
	Slip	Slip during rotation	Low voltage	Check battery
			Oil stick at clutch	Clean
			Malfunction	Replace

(2) How to check the air conditioning system with the needle of high low gauge

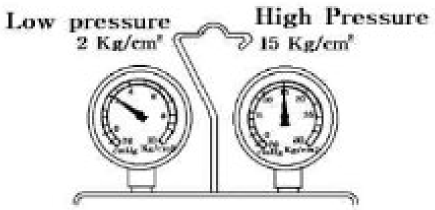
To connect with manifold pressure gauge can find the cause of air conditioning system.
Because manifold pressure gauge is various sensibly (Ambient Temp. is based on 30~35℃)

Caution:
Operating E/G RPM 1500~2000 is must, and so to that you can check the correct cause and air conditioning.
(In case below the figure of indicated pressure gauge has some clearance, confirm with approximate indicated needle data.)

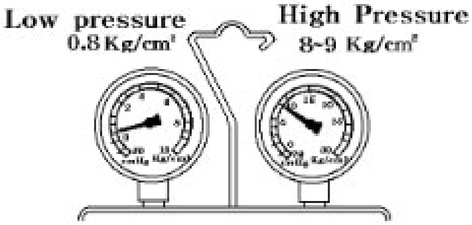
Gauge pressure conversion
- ● lb/in^2=PSI
- ●1 kg/㎠=14,223 lb/in^2

(Ex) 200 PSI=14 kgf/㎠

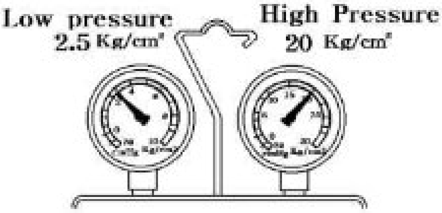
1.Normal

ⓐ	Pressure	• Low pressure : 1.5~2.0 kg/㎠ • High pressure: 14.5~15.0 kg/㎠	 Low pressure 2 Kg/cm^2 High Pressure 15 Kg/cm^2
ⓑ	Estimate	• Refrigerant condition good •Air conditioning good • Normal air conditioning system	

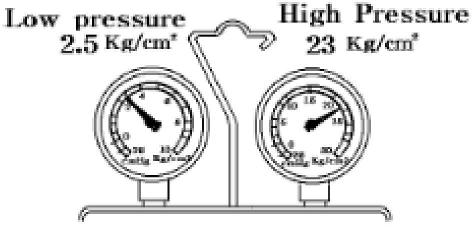
2. Deficient of Refrigerant Gas

ⓐ	Pressure	● Low pressure : 0.8 kg/㎠(Low) ● High pressure: 8~9 kg/㎠(Low)	 Low pressure 0.8 Kg/cm^2 High Pressure 8~9 Kg/cm^2
ⓑ	Situation	● Deficient of air conditioning (Air duct is not cool) ● Many bubbles at sight glass	
ⓒ	Cause	● Refrigerant leakage in the air condition ● Clogged the expansion valve ● clogged the receiver drier	
ⓓ	Estimate	● Deficient of refrigerant and leakage in the air conditioning system	
ⓔ	Remedy	●Replenish the refrigerant and repair partially ●Repair the expansion valve and the receive drier or replace	

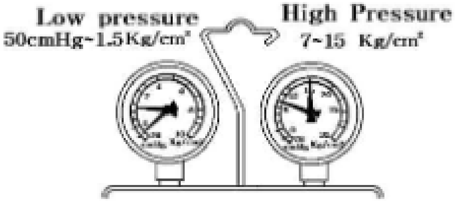
3.Too much the refrigerant

ⓐ	Pressure	●Low pressure : 2.5 kg/㎠(High) ●High pressure: 20 kg/㎠(High)	 Low pressure 2.5 Kg/cm^2 High Pressure 20 Kg/cm^2
ⓑ	Situation	● Refrigerant condition is not good ●Never seen the bubble at sight glass	
ⓒ	Cause	●Much refrigerant ●Defect of the condenser	
ⓓ	Estimate	●Overcharged the refrigerant ●Defect of the condenser: Pin and the cooling fan	
ⓔ	Remedy	●Deflate the refrigerant ●Clean the condenser, and check the cooling fan belt	

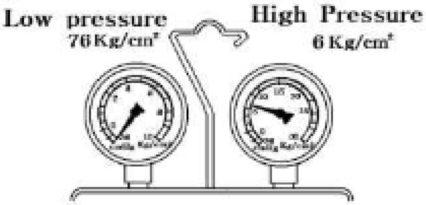
4.mixed Air in the air conditioning system

ⓐ	Pressure	●Low pressure : 2.5 kg/㎠(High) ●High pressure: 23 kg/㎠(High)	
ⓑ	Situation	● Deficient of cooling condition (Not cool) ● Not cool when touch the low pipe	
ⓒ	Cause	●Air was mixed in the air conditioning system	
ⓓ	Estimate	●Defect of the vacuum work in the air conditioning system	
ⓔ	Remedy	●Remove the vacuum and replenish the refrigerant ●Contaminated oil in the condenser: Clean and replace ●Replace the receive dryer	

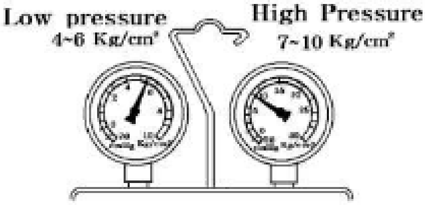
5.mixed H_2O in the air conditioning System

ⓐ	Pressure	●Low pressure : Low~1.5 kg/㎠ (Low or vibrate seriously) ●High pressure: 7~15 kg/㎠ (Low or vibrate seriously)	 Low pressure 50cmHg~1.5Kg/cm² High Pressure 7~15 Kg/cm²
ⓑ	Situation	● Air conditioning is cool and is not periodically ● Manifold gauge pressure is occasionally down or normal	
ⓒ	Cause	●The expansion valve is freezing occasionally Mixed with H_2O in the air conditioning system	
ⓓ	Estimate	●Receive dryer is over-saturation ●H_2O was freezing in the expansion valve	
ⓔ	Remedy	●Replenish the refrigerant ●Replace the receive dryer	

6.Refrigerant doesn’t circulate in the Air conditioning system

ⓐ	Pressure	●Low pressure : Negative pressure (Low) ●High pressure: 6 kg/㎠(Low)	
ⓑ	Situation	● Deficient air conditioning (Not cool) ● Cool occasionally	
ⓒ	Cause	●Clogged in the Expansion valve hole (Clogged by foreign matter or freezing, dust)	
ⓓ	Estimate	●Clogged in the expansion valve	
ⓔ	Remedy	●Remove the wet : Replenish the refrigerant ●Remove dust : Disassemble the expansion valve and clean with air lower and replace ●Replace the receive dryer: Leakage in the expansion valve replace	

7.Defect of the compressor pressure

ⓐ	Pressure	●Low pressure : 4~6 kg/㎠(High) ●High pressure: 7~10 kg/㎠(Low)	
ⓑ	Situation	● Deficient air conditioning (Not cool)	
ⓒ	Cause	●Compressor inside leakage	
ⓓ	Estimate	●Defect pressure of the compressor (Valve leakage or damaged)	
ⓔ	Remedy	●Repair or replace	

Section 6. CABIN WIRING INSTRUCTION DIAGRAM

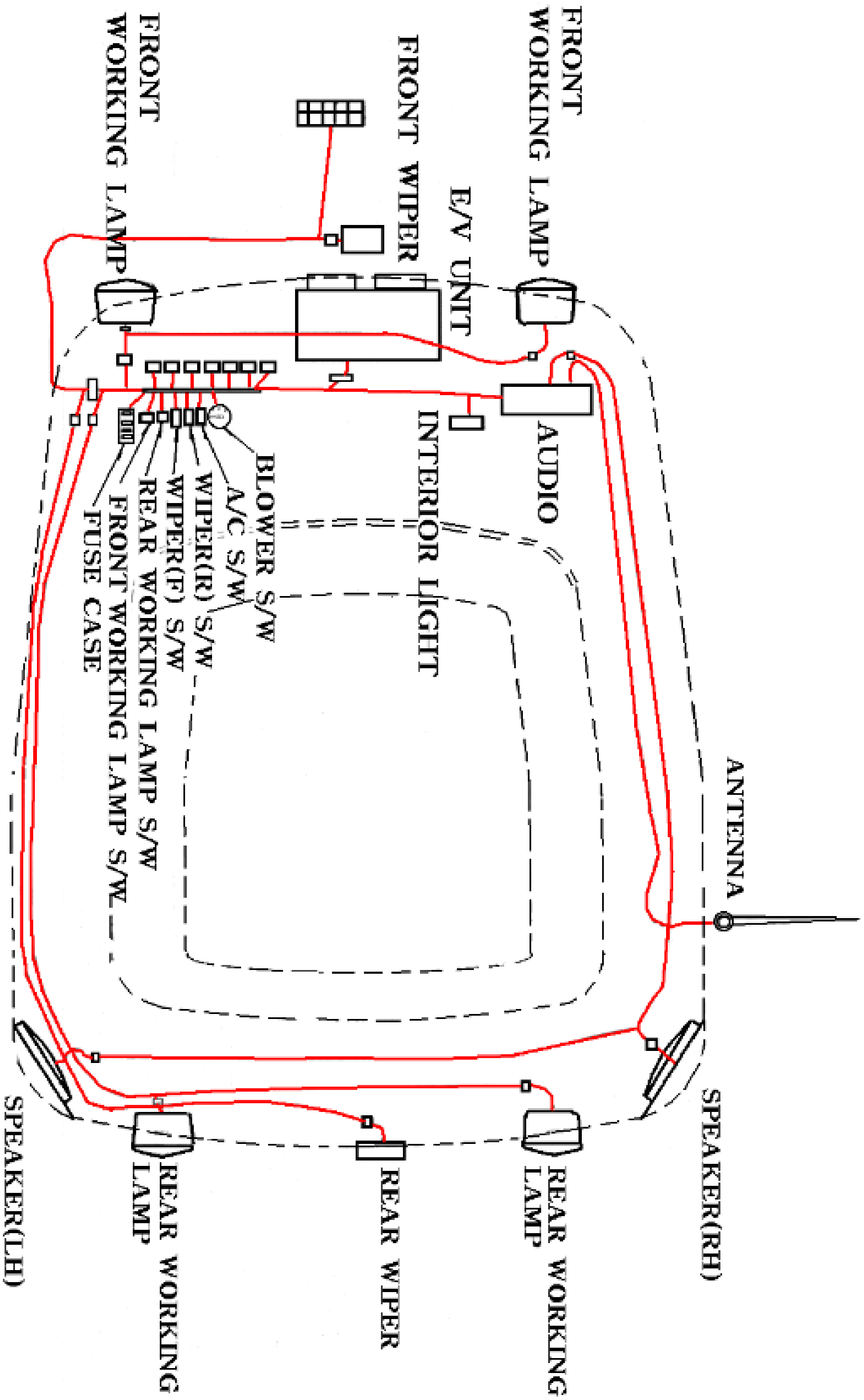


Fig.11-27

Section 7. CABIN WIRING DIAGRAM

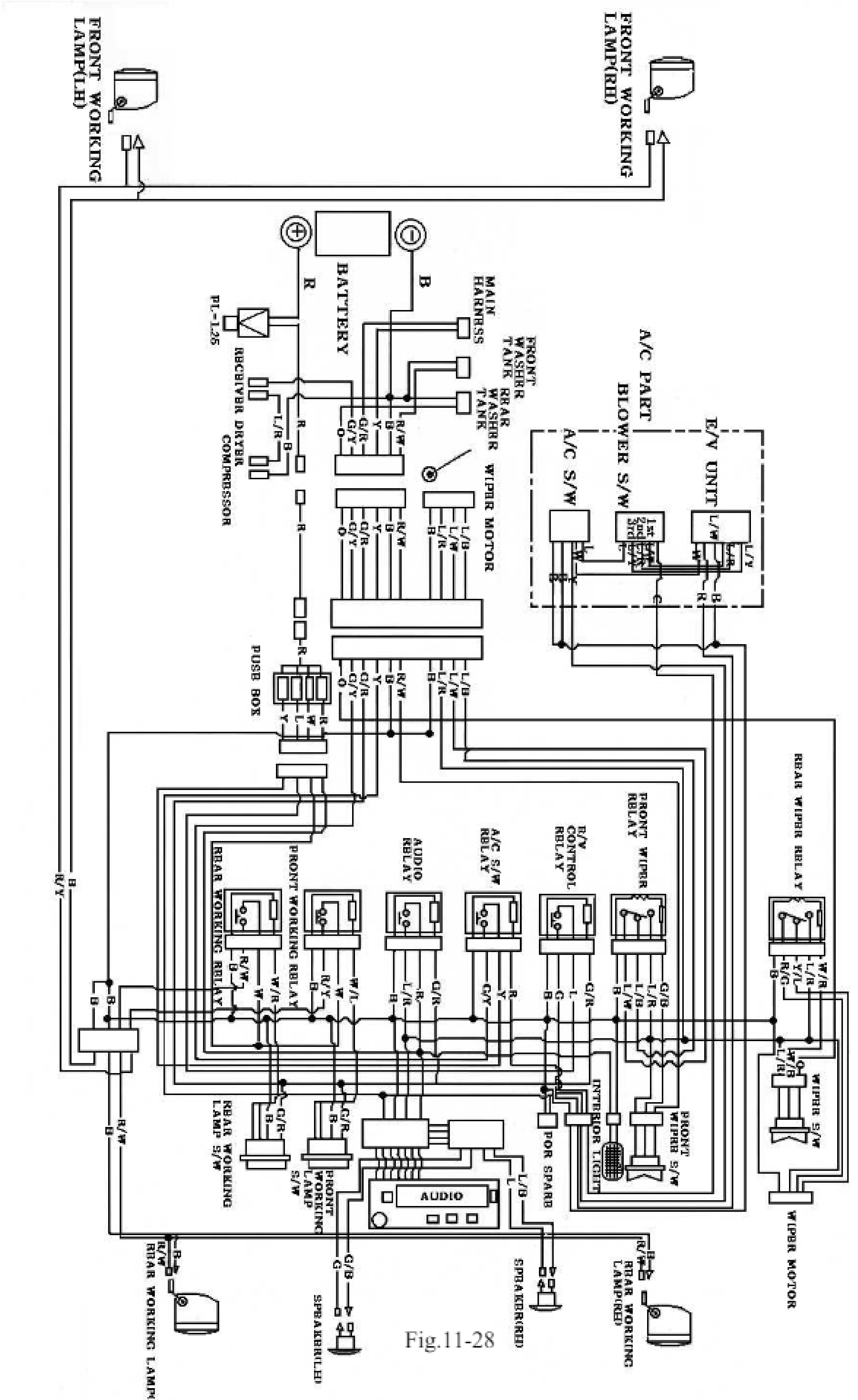


Fig.11-28

CHAPTER 12. CONVERSION TABLES

SECTION 1. CONVERSION TABLES

Millimeters to inches							
mm	in	mm	in	mm	in	mm	in
1	0.0394	26	1.0236	51	2.0079	76	2.9921
2	0.0787	27	1.0630	52	2.0472	77	3.0315
3	0.1181	28	1.1024	53	2.0866	78	3.0709
4	0.1575	29	1.1417	54	2.1260	79	3.1102
5	0.1969	30	1.1811	55	2.1654	80	3.1496
6	0.2362	31	1.2205	56	2.2047	81	3.1890
7	0.2756	32	1.2598	57	2.2441	82	3.2283
8	0.3150	33	1.2992	58	2.2835	83	3.2677
9	0.3543	34	1.3386	59	2.3228	84	3.3071
10	0.3937	35	1.3780	60	2.3622	85	3.3465
11	0.4331	36	1.4173	61	2.4016	86	3.3858
12	0.4724	37	1.4567	62	2.4409	87	3.4252
13	0.5118	38	1.4961	63	2.4803	88	3.4646
14	0.5512	39	1.5354	64	2.5197	89	3.5039
15	0.5906	40	1.5748	65	2.5591	90	3.5433
16	0.6299	41	1.6142	66	2.5984	91	3.5827
17	0.6693	42	1.6535	67	2.6378	92	3.6220
18	0.7087	43	1.6929	68	2.6772	93	3.6614
19	0.7480	44	1.7323	69	2.7165	94	3.7008
20	0.7874	45	1.7717	70	2.7559	95	3.7402
21	0.8268	46	1.8110	71	2.7953	96	3.7795
22	0.8661	47	1.8504	72	2.8346	97	3.8189
23	0.9055	48	1.8898	73	2.8740	98	3.8583
24	0.9449	49	1.9291	74	2.9134	99	3.8976
25	0.9843	50	1.9685	75	2.9528	100	3.9370

Inches to millimeters					
in	mm	in	mm	in	mm
1/64	0.3969	25/64	9.9219	13/16	20.6375
1/32	0.7938	13/32	10.3188	53/64	21.0344
3/64	1.1906	27/64	10.7156	27/32	21.4313
1/16	1.5875	7/16	11.1125	55/64	21.8281
5/64	1.9844	29/64	11.5094	7/8	22.2250
3/32	2.3813	15/32	11.9063	57/64	22.6219
7/64	2.7781	31/64	12.3031	29/32	23.0188
1/8	3.1750	1/2	12.7000	59/64	23.4156
9/64	3.5719	33/64	13.0969	15/16	23.8125
5/32	3.9688	17/32	13.4938	61/64	24.2094
11/64	4.3656	35/64	13.8906	31/32	24.6063
3/16	4.7625	9/16	14.2875	63/64	25.0031
13/64	5.1594	37/64	14.6844		
7/32	5.5563	19/32	15.0813		
15/64	5.9531	39/64	15.4781		
1/4	6.3500	5/8	15.8750		
17/64	6.7469	41/64	16.2719		
9/32	7.1438	21/32	16.6688		
19/64	7.5406	43/64	17.0656		
5/16	7.9375	11/16	17.4625		
21/64	8.3344	45/64	17.8594		
11/32	8.7313	23/32	18.2563		
23/64	9.1281	47/64	18.6531		
3/8	9.5250	3/4	19.0500		
		49/64	19.4469		
		25/32	19.8438		
		51/64	20.2406		

Length

Feet to Meters

ft	0	1	2	3	4	5	6	7	8	9	ft
	m	m	m	m	m	m	m	m	m	m	
0	0.0000	0.3050	0.6100	0.9150	1.2200	1.5250	1.8300	2.1350	2.4400	2.7450	0
10	8.0532	3.3550	3.6600	3.9650	4.2700	4.5750	4.8800	5.1850	5.4900	5.7950	10
20	21.1097	6.4050	6.7100	7.0150	7.3200	7.6250	7.9300	8.2350	8.5400	8.8450	20
30	34.1661	9.4550	9.7600	10.0650	10.3700	10.6750	10.9800	11.2850	11.5900	11.8950	30
40	47.2225	12.5050	12.8100	13.1150	13.4200	13.7250	14.0300	14.3350	14.6400	14.9450	40
50	60.2790	15.5550	15.8600	16.1650	16.4700	16.7750	17.0800	17.3850	17.6900	17.9950	50
60	73.3354	18.6050	18.9100	19.2150	19.5200	19.8250	20.1300	20.4350	20.7400	21.0450	60
70	86.3919	21.6550	21.9600	22.2650	22.5700	22.8750	23.1800	23.4850	23.7900	24.0950	70
80	99.4483	24.7050	25.0100	25.3150	25.6200	25.9250	26.2300	26.5350	26.8400	27.1450	80
90	112.5047	27.7550	28.0600	28.3650	28.6700	28.9750	29.2800	29.5850	29.8900	30.1950	90
100	125.5612	30.8050	31.1100	31.4150	31.7200	32.0250	32.3300	32.6350	32.9400	33.2450	100

Meters to Feet

m	0	1	2	3	4	5	6	7	8	9	m
	ft	ft	ft	ft	ft	ft	ft	ft	ft	ft	
0	0.0000	3.2808	6.5616	9.8424	13.1232	16.4040	19.6848	22.9656	26.2464	29.5272	0
10	32.8080	36.0888	39.3696	42.6504	45.9312	49.2120	52.4928	55.7736	59.0544	62.3352	10
20	65.6160	68.8968	72.1776	75.4584	78.7392	82.0200	85.3008	88.5816	91.8624	95.1432	20
30	98.4240	101.7048	104.9856	108.2664	111.5472	114.8280	118.1088	121.3896	124.6704	127.9512	30
40	131.2320	134.5128	137.7936	141.0744	144.3552	147.6360	150.9168	154.1976	157.4784	160.7592	40
50	164.0400	167.3208	170.6016	173.8824	177.1632	180.4440	183.7248	187.0056	190.2864	193.5672	50
60	196.8480	200.1288	203.4096	206.6904	209.9712	213.2520	216.5328	219.8136	223.0944	226.3752	60
70	229.6560	232.9368	236.2176	239.4984	242.7792	246.0600	249.3408	252.6216	255.9024	259.1832	70
80	262.4640	265.7448	269.0256	272.3064	275.5872	278.8680	282.1488	285.4296	288.7104	291.9912	80
90	295.2720	298.5528	301.8336	305.1144	308.3952	311.6760	314.9568	318.2376	321.5184	324.7992	90
100	328.0800	331.3608	334.6416	337.9224	341.2032	344.4840	347.7648	351.0456	354.3264	357.6072	100

Mile to kilometers

miles	0	1	2	3	4	5	6	7	8	9	miles
	Km	Km	Km	Km	Km	Km	Km	Km	Km	Km	
0	0.000	1.609	3.218	4.827	6.436	8.045	9.654	11.263	12.872	14.481	0
10	16.090	17.699	19.308	20.917	22.526	24.135	25.744	27.353	28.962	30.571	10
20	32.180	33.789	35.398	37.007	38.616	40.225	41.834	43.443	45.052	46.661	20
30	48.270	49.879	51.488	53.097	54.706	56.315	57.924	59.533	61.142	62.751	30
40	64.360	65.969	67.578	69.187	70.796	72.405	74.014	75.623	77.232	78.841	40
50	80.450	82.059	83.668	85.277	86.886	88.495	90.104	91.713	93.322	94.931	50
60	96.540	98.149	99.758	101.367	102.976	104.585	106.194	107.803	109.412	111.021	60
70	112.630	114.239	115.848	117.457	119.066	120.675	122.284	123.893	125.502	127.111	70
80	128.720	130.329	131.938	133.547	135.156	136.765	138.374	139.983	141.592	143.201	80
90	144.810	146.419	148.028	149.637	151.246	152.855	154.464	156.073	157.682	159.291	90
100	160.900	162.509	164.118	165.727	167.336	168.945	170.554	172.163	173.772	175.381	100

kilometers to Miles

Km	0	1	2	3	4	5	6	7	8	9	Km
	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	Miles	
0	0.000	0.621	1.242	1.863	2.484	3.105	3.726	4.347	4.968	5.589	0
10	6.210	6.831	7.452	8.073	8.694	9.315	9.936	10.557	11.178	11.799	10
20	12.420	13.041	13.662	14.283	14.904	15.525	16.146	16.767	17.388	18.009	20
30	18.630	19.251	19.872	20.493	21.114	21.735	22.356	22.977	23.598	24.219	30
40	24.840	25.461	26.082	26.703	27.324	27.945	28.566	29.187	29.808	30.429	40
50	31.050	31.671	32.292	32.913	33.534	34.155	34.776	35.397	36.018	36.639	50
60	37.260	37.881	38.502	39.123	39.744	40.365	40.986	41.607	42.228	42.849	60
70	43.470	44.091	44.712	45.333	45.954	46.575	47.196	47.817	48.438	49.059	70
80	49.680	50.301	50.922	51.543	52.164	52.785	53.406	54.027	54.648	55.269	80
90	55.890	56.511	57.132	57.753	58.374	58.995	59.616	60.237	60.858	61.479	90
100	62.100	62.721	63.342	63.963	64.584	65.205	65.826	66.447	67.068	67.689	100

Area

Square inches to square centimeters

in2	0	1	2	3	4	5	6	7	8	9	in2
	cm2	cm2	cm2	cm2	cm2	cm2	cm2	cm2	cm2	cm2	
0	0.000	6.462	12.924	19.386	25.848	32.310	38.772	45.234	51.696	58.158	0
10	64.620	71.082	77.544	84.006	90.468	96.930	103.392	109.854	116.316	122.778	10
20	129.240	135.702	142.164	148.626	155.088	161.550	168.012	174.474	180.936	187.398	20
30	193.860	200.322	206.784	213.246	219.708	226.170	232.632	239.094	245.556	252.018	30
40	258.480	264.942	271.404	277.866	284.328	290.790	297.252	303.714	310.176	316.638	40
50	323.100	329.562	336.024	342.486	348.948	355.410	361.872	368.334	374.796	381.258	50
60	387.720	394.182	400.644	407.106	413.568	420.030	426.492	432.954	439.416	445.878	60
70	452.340	458.802	465.264	471.726	478.188	484.650	491.112	497.574	504.036	510.498	70
80	516.960	523.422	529.884	536.346	542.808	549.270	555.732	562.194	568.656	575.118	80
90	581.580	588.042	594.504	600.966	607.428	613.890	620.352	626.814	633.276	639.738	90
100	646.200	652.662	659.124	665.586	672.048	678.510	684.972	691.434	697.896	704.358	100

Square centimeters to Square inches

cm2	0	1	2	3	4	5	6	7	8	9	cm2
	in2	in2	in2	in2	in2	in2	in2	in2	in2	in2	
0	0.000	0.155	0.310	0.465	0.620	0.775	0.930	1.085	1.240	1.395	0
10	1.550	1.705	1.860	2.015	2.170	2.325	2.480	2.635	2.790	2.945	10
20	3.100	3.255	3.410	3.565	3.720	3.875	4.030	4.185	4.340	4.495	20
30	4.650	4.805	4.960	5.115	5.270	5.425	5.580	5.735	5.890	6.045	30
40	6.200	6.355	6.510	6.665	6.820	6.975	7.130	7.285	7.440	7.595	40
50	7.750	7.905	8.060	8.215	8.370	8.525	8.680	8.835	8.990	9.145	50
60	9.300	9.455	9.610	9.765	9.920	10.075	10.230	10.385	10.540	10.695	60
70	10.850	11.005	11.160	11.315	11.470	11.625	11.780	11.935	12.090	12.245	70
80	12.400	12.555	12.710	12.865	13.020	13.175	13.330	13.485	13.640	13.795	80
90	13.950	14.105	14.260	14.415	14.570	14.725	14.880	15.035	15.190	15.345	90
100	15.500	15.655	15.810	15.965	16.120	16.275	16.430	16.585	16.740	16.895	100

Cubic inches to Cubic Centimeters

in3	0	1	2	3	4	5	6	7	8	9	in3
	cm3(cc)	cm3(cc)	cm3(cc)	cm3(cc)	cm3(cc)	cm3(cc)	cm3(cc)	cm3(cc)	cm3(cc)	cm3(cc)	
0	0.000	16.387	32.774	49.161	65.548	81.935	98.322	114.709	131.096	147.483	0
10	163.870	180.257	196.644	213.031	229.418	245.805	262.192	278.579	294.966	311.353	10
20	327.740	344.127	360.514	376.901	393.288	409.675	426.062	442.449	458.836	475.223	20
30	491.610	507.997	524.384	540.771	557.158	573.545	589.932	606.319	622.706	639.093	30
40	655.480	671.867	688.254	704.641	721.028	737.415	753.802	770.189	786.576	802.963	40
50	819.350	835.737	852.124	868.511	884.898	901.285	917.672	934.059	950.446	966.833	50
60	983.220	999.607	1015.994	1032.381	1048.768	1065.155	1081.542	1097.929	1114.316	1130.703	60
70	1147.090	1163.477	1179.864	1196.251	1212.638	1229.025	1245.412	1261.799	1278.186	1294.573	70
80	1310.960	1327.347	1343.734	1360.121	1376.508	1392.895	1409.282	1425.669	1442.056	1458.443	80
90	1474.830	1491.217	1507.604	1523.991	1540.378	1556.765	1573.152	1589.539	1605.926	1622.313	90
100	1638.700	1655.087	1671.474	1687.861	1704.248	1720.635	1737.022	1753.409	1769.796	1786.183	100

Cubic Centimeters to cubic inches

cm3(cc)	0	1	2	3	4	5	6	7	8	9	cm3(cc)
	in3	in3	in3	in3	in3	in3	in3	in3	in3	in3	
0	0.0000	0.0610	0.1221	0.1831	0.2441	0.3051	0.3662	0.4272	0.4882	0.5492	0
10	0.6103	0.6713	0.7323	0.7933	0.8544	0.9154	0.9764	1.0374	1.0985	1.1595	10
20	1.2205	1.2815	1.3426	1.4036	1.4646	1.5256	1.5867	1.6477	1.7087	1.7697	20
30	1.8308	1.8918	1.9528	2.0138	2.0749	2.1359	2.1969	2.2579	2.3190	2.3800	30
40	2.4410	2.5020	2.5631	2.6241	2.6851	2.7461	2.8072	2.8682	2.9292	2.9902	40
50	3.0513	3.1123	3.1733	3.2343	3.2954	3.3564	3.4174	3.4784	3.5395	3.6005	50
60	3.6615	3.7225	3.7836	3.8446	3.9056	3.9666	4.0277	4.0887	4.1497	4.2107	60
70	4.2718	4.3328	4.3938	4.4548	4.5159	4.5769	4.6379	4.6989	4.7600	4.8210	70
80	4.8820	4.9430	5.0041	5.0651	5.1261	5.1871	5.2482	5.3092	5.3702	5.4312	80
90	5.4923	5.5533	5.6143	5.6753	5.7364	5.7974	5.8584	5.9194	5.9805	6.0415	90
100	6.1025	6.1635	6.2246	6.2856	6.3466	6.4076	6.4687	6.5297	6.5907	6.6517	100

	Volume				Gallons(U.S) to Liters					
US gal	0	1	2	3	4	5	6	7	8	9	US gal
	Liters	Liters	Liters	Liters	Liters	Liters	Liters	Liters	Liters	Liters	
0	0.000	3.785	7.571	11.356	15.142	18.927	22.712	26.498	30.283	34.069	0
10	37.854	41.639	45.425	49.210	52.996	56.781	60.566	64.352	68.137	71.923	10
20	75.708	79.493	83.279	87.064	90.850	94.635	98.420	102.206	105.991	109.777	20
30	113.562	117.347	121.133	124.918	128.704	132.489	136.274	140.060	143.845	147.631	30
40	151.416	155.201	158.987	162.772	166.558	170.343	174.128	177.914	181.699	185.485	40
50	189.270	193.055	196.841	200.626	204.412	208.197	211.982	215.768	219.553	223.339	50
60	227.124	230.909	234.695	238.480	242.266	246.051	249.836	253.622	257.407	261.193	60
70	264.978	268.763	272.549	276.334	280.120	283.905	287.690	291.476	295.261	299.047	70
80	302.832	306.617	310.403	314.188	317.974	321.759	325.544	329.330	333.115	336.901	80
90	340.686	344.471	348.257	352.042	355.828	359.613	363.398	367.184	370.969	374.755	90
100	378.540	382.325	386.111	389.896	393.682	397.467	401.252	405.038	408.823	412.609	100

					Liters to Gallons(U.S)					
Liters	0	1	2	3	4	5	6	7	8	9	Liters
	US gal	US gal	US gal	US gal	US gal	US gal	US gal	US gal	US gal	US gal	
0	0.000	0.264	0.528	0.793	1.057	1.321	1.585	1.849	2.114	2.378	0
10	2.642	2.906	3.170	3.435	3.699	3.963	4.227	4.491	4.756	5.020	10
20	5.284	5.548	5.812	6.077	6.341	6.605	6.869	7.133	7.398	7.662	20
30	7.926	8.190	8.454	8.719	8.983	9.247	9.511	9.775	10.040	10.304	30
40	10.568	10.832	11.096	11.361	11.625	11.889	12.153	12.417	12.682	12.946	40
50	13.210	13.474	13.738	14.003	14.267	14.531	14.795	15.059	15.324	15.588	50
60	15.852	16.116	16.380	16.645	16.909	17.173	17.437	17.701	17.966	18.230	60
70	18.494	18.758	19.022	19.287	19.551	19.815	20.079	20.343	20.608	20.872	70
80	21.136	21.400	21.664	21.929	22.193	22.457	22.721	22.985	23.250	23.514	80
90	23.778	24.042	24.306	24.571	24.835	25.099	25.363	25.627	25.892	26.156	90
100	26.420	26.684	26.948	27.213	27.477	27.741	28.005	28.269	28.534	28.798	100

					Gallons(IMP.) to Liters					
Imp. ga	0	1	2	3	4	5	6	7	8	9	Imp. gal
	Liters	Liters	Liters	Liters	Liters	Liters	Liters	Liters	Liters	Liters	
0	0.0000	4.5460	9.0920	13.6380	18.1840	22.7300	27.2760	31.8220	36.3680	40.9140	0
10	45.4600	50.0060	54.5520	59.0980	63.6440	68.1900	72.7360	77.2820	81.8280	86.3740	10
20	90.9200	95.4660	100.0120	104.5580	109.1040	113.6500	118.1960	122.7420	127.2880	131.8340	20
30	136.3800	140.9260	145.4720	150.0180	154.5640	159.1100	163.6560	168.2020	172.7480	177.2940	30
40	181.8400	186.3860	190.9320	195.4780	200.0240	204.5700	209.1160	213.6620	218.2080	222.7540	40
50	227.3000	231.8460	236.3920	240.9380	245.4840	250.0300	254.5760	259.1220	263.6680	268.2140	50
60	272.7600	277.3060	281.8520	286.3980	290.9440	295.4900	300.0360	304.5820	309.1280	313.6740	60
70	318.2200	322.7660	327.3120	331.8580	336.4040	340.9500	345.4960	350.0420	354.5880	359.1340	70
80	363.6800	368.2260	372.7720	377.3180	381.8640	386.4100	390.9560	395.5020	400.0480	404.5940	80
90	409.1400	413.6860	418.2320	422.7780	427.3240	431.8700	436.4160	440.9620	445.5080	450.0540	90
100	454.6000	459.1460	463.6920	468.2380	472.7840	477.3300	481.8760	486.4220	490.9680	495.5140	100

					Liters to Gallons(IMP)					
Liters	0	1	2	3	4	5	6	7	8	9	Liters
	gal	gal	gal	gal	gal	gal	gal	gal	gal	gal	
0	0.0000	0.2200	0.4400	0.6600	0.8800	1.1000	1.3200	1.5400	1.7600	1.9800	0
10	2.2000	2.4200	2.6400	2.8600	3.0800	3.3000	3.5200	3.7400	3.9600	4.1800	10
20	4.4000	4.6200	4.8400	5.0600	5.2800	5.5000	5.7200	5.9400	6.1600	6.3800	20
30	6.6000	6.8200	7.0400	7.2600	7.4800	7.7000	7.9200	8.1400	8.3600	8.5800	30
40	8.8000	9.0200	9.2400	9.4600	9.6800	9.9000	10.1200	10.3400	10.5600	10.7800	40
50	11.0000	11.2200	11.4400	11.6600	11.8800	12.1000	12.3200	12.5400	12.7600	12.9800	50
60	13.2000	13.4200	13.6400	13.8600	14.0800	14.3000	14.5200	14.7400	14.9600	15.1800	60
70	15.4000	15.6200	15.8400	16.0600	16.2800	16.5000	16.7200	16.9400	17.1600	17.3800	70
80	17.6000	17.8200	18.0400	18.2600	18.4800	18.7000	18.9200	19.1400	19.3600	19.5800	80
90	19.8000	20.0200	20.2400	20.4600	20.6800	20.9000	21.1200	21.3400	21.5600	21.7800	90
100	22.0000	22.2200	22.4400	22.6600	22.8800	23.1000	23.3200	23.5400	23.7600	23.9800	100

MASS

Pounds to Kilograms

lbs	0	1	2	3	4	5	6	7	8	9	lbs
	Kg	Kg	Kg	Kg	Kg	Kg	Kg	Kg	Kg	Kg	
0	0.000	0.454	0.907	1.361	1.814	2.268	2.722	3.175	3.629	4.082	0
10	4.536	4.990	5.443	5.897	6.350	6.804	7.258	7.711	8.165	8.618	10
20	9.072	9.526	9.979	10.433	10.886	11.340	11.794	12.247	12.701	13.154	20
30	13.608	14.062	14.515	14.969	15.422	15.876	16.330	16.783	17.237	17.690	30
40	18.144	18.598	19.051	19.505	19.958	20.412	20.866	21.319	21.773	22.226	40
50	22.680	23.134	23.587	24.041	24.494	24.948	25.402	25.855	26.309	26.762	50
60	27.216	27.670	28.123	28.577	29.030	29.484	29.938	30.391	30.845	31.298	60
70	31.752	32.206	32.659	33.113	33.566	34.020	34.474	34.927	35.381	35.834	70
80	36.288	36.742	37.195	37.649	38.102	38.556	39.010	39.463	39.917	40.370	80
90	40.824	41.278	41.731	42.185	42.638	43.092	43.546	43.999	44.453	44.906	90
100	45.360	45.814	46.267	46.721	47.174	47.628	48.082	48.535	48.989	49.442	100

Kilograms to pound

Kg	0	1	2	3	4	5	6	7	8	9	Kg
	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	lbs	
0	0.000	2.205	4.409	6.614	8.818	11.023	13.228	15.432	17.637	19.841	0
10	22.046	24.251	26.455	28.660	30.864	33.069	35.274	37.478	39.683	41.887	10
20	44.092	46.297	48.501	50.706	52.910	55.115	57.320	59.524	61.729	63.933	20
30	66.138	68.343	70.547	72.752	74.956	77.161	79.366	81.570	83.775	85.979	30
40	88.184	90.389	92.593	94.798	97.002	99.207	101.412	103.616	105.821	108.025	40
50	110.230	112.435	114.639	116.844	119.048	121.253	123.458	125.662	127.867	130.071	50
60	132.276	134.481	136.685	138.890	141.094	143.299	145.504	147.708	149.913	152.117	60
70	154.322	156.527	158.731	160.936	163.140	165.345	167.550	169.754	171.959	174.163	70
80	176.368	178.573	180.777	182.982	185.186	187.391	189.596	191.800	194.005	196.209	80
90	198.414	200.619	202.823	205.028	207.232	209.437	211.642	213.846	216.051	218.255	90
100	220.460	222.665	224.869	227.074	229.278	231.483	233.688	235.892	238.097	240.301	100

Kilograms to Newton

Kg	0	1	2	3	4	5	6	7	8	9	Kg
	N	N	N	N	N	N	N	N	N	N	
0	0.000	9.807	19.614	29.421	39.228	49.035	58.842	68.649	78.456	88.263	0
10	98.070	107.877	117.684	127.491	137.298	147.105	156.912	166.719	176.526	186.333	10
20	196.140	205.947	215.754	225.561	235.368	245.175	254.982	264.789	274.596	284.403	20
30	294.210	304.017	313.824	323.631	333.438	343.245	353.052	362.859	372.666	382.473	30
40	392.280	402.087	411.894	421.701	431.508	441.315	451.122	460.929	470.736	480.543	40
50	490.350	500.157	509.964	519.771	529.578	539.385	549.192	558.999	568.806	578.613	50
60	588.420	598.227	608.034	617.841	627.648	637.455	647.262	657.069	666.876	676.683	60
70	686.490	696.297	706.104	715.911	725.718	735.525	745.332	755.139	764.946	774.753	70
80	784.560	794.367	804.174	813.981	823.788	833.595	843.402	853.209	863.016	872.823	80
90	882.630	892.437	902.244	912.051	921.858	931.665	941.472	951.279	961.086	970.893	90
100	980.700	990.507	1000.314	1010.121	1019.928	1029.735	1039.542	1049.349	1059.156	1068.963	100

Newton to Kilograms

N	0	1	2	3	4	5	6	7	8	9	N
	Kg	Kg	Kg	Kg	Kg	Kg	Kg	Kg	Kg	Kg	
0	0.000	1.020	2.039	3.059	4.079	5.099	6.118	7.138	8.158	9.177	0
10	10.197	11.217	12.236	13.256	14.276	15.296	16.315	17.335	18.355	19.374	10
20	20.394	21.414	22.433	23.453	24.473	25.493	26.512	27.532	28.552	29.571	20
30	30.591	31.611	32.630	33.650	34.670	35.690	36.709	37.729	38.749	39.768	30
40	40.788	41.808	42.827	43.847	44.867	45.887	46.906	47.926	48.946	49.965	40
50	50.985	52.005	53.024	54.044	55.064	56.084	57.103	58.123	59.143	60.162	50
60	61.182	62.202	63.221	64.241	65.261	66.281	67.300	68.320	69.340	70.359	60
70	71.379	72.399	73.418	74.438	75.458	76.478	77.497	78.517	79.537	80.556	70
80	81.576	82.596	83.615	84.635	85.655	86.675	87.694	88.714	89.734	90.753	80
90	91.773	92.793	93.812	94.832	95.852	96.872	97.891	98.911	99.931	100.950	90
100	101.970	102.990	104.009	105.029	106.049	107.069	108.088	109.108	110.128	111.147	100

	Pressure Pounds per square inches to Kilograms per square centimeters										
b/in2(PSI	0	1	2	3	4	5	6	7	8	9	lb/in2(PSI)
	Kg/cm2	Kg/cm2	Kg/cm2	Kg/cm2	Kg/cm2	Kg/cm2	Kg/cm2	Kg/cm2	Kg/cm2	Kg/cm2	
0	0.0000	0.0703	0.1406	0.2109	0.2812	0.3516	0.4219	0.4922	0.5625	0.6328	0
10	0.7031	0.7734	0.8437	0.9140	0.9843	1.0547	1.1250	1.1953	1.2656	1.3359	10
20	1.4062	1.4765	1.5468	1.6171	1.6874	1.7578	1.8281	1.8984	1.9687	2.0390	20
30	2.1093	2.1796	2.2499	2.3202	2.3905	2.4609	2.5312	2.6015	2.6718	2.7421	30
40	2.8124	2.8827	2.9530	3.0233	3.0936	3.1640	3.2343	3.3046	3.3749	3.4452	40
50	3.5155	3.5858	3.6561	3.7264	3.7967	3.8671	3.9374	4.0077	4.0780	4.1483	50
60	4.2186	4.2889	4.3592	4.4295	4.4998	4.5702	4.6405	4.7108	4.7811	4.8514	60
70	4.9217	4.9920	5.0623	5.1326	5.2029	5.2733	5.3436	5.4139	5.4842	5.5545	70
80	5.6248	5.6951	5.7654	5.8357	5.9060	5.9764	6.0467	6.1170	6.1873	6.2576	80
90	6.3279	6.3982	6.4685	6.5388	6.6091	6.6795	6.7498	6.8201	6.8904	6.9607	90
100	7.0310	7.1013	7.1716	7.2419	7.3122	7.3826	7.4529	7.5232	7.5935	7.6638	100

	Kilograms per square centimeters to Pounds per square inches										
Kg/cm2	0	1	2	3	4	5	6	7	8	9	Kg/cm2
	lb/in2(psi)	lb/in2(psi)	lb/in2(psi)	lb/in2(psi)	lb/in2(psi)	lb/in2(psi)	lb/in2(psi)	lb/in2(psi)	lb/in2(psi)	lb/in2(psi)	
0	0.00	14.22	28.45	42.67	56.89	71.12	85.34	99.56	113.78	128.01	0
10	142.23	156.45	170.68	184.90	199.12	213.35	227.57	241.79	256.01	270.24	10
20	284.46	298.68	312.91	327.13	341.35	355.58	369.80	384.02	398.24	412.47	20
30	426.69	440.91	455.14	469.36	483.58	497.81	512.03	526.25	540.47	554.70	30
40	568.92	583.14	597.37	611.59	625.81	640.04	654.26	668.48	682.70	696.93	40
50	711.15	725.37	739.60	753.82	768.04	782.27	796.49	810.71	824.93	839.16	50
60	853.38	867.60	881.83	896.05	910.27	924.50	938.72	952.94	967.16	981.39	60
70	995.61	1009.83	1024.06	1038.28	1052.50	1066.73	1080.95	1095.17	1109.39	1123.62	70
80	1137.84	1152.06	1166.29	1180.51	1194.73	1208.96	1223.18	1237.40	1251.62	1265.85	80
90	1280.07	1294.29	1308.52	1322.74	1336.96	1351.19	1365.41	1379.63	1393.85	1408.08	90
100	1422.30	1436.52	1450.75	1464.97	1479.19	1493.42	1507.64	1521.86	1536.08	1550.31	100

	Kilograms per square centimeters to Kilo pascal										
Kg/cm2	0	1	2	3	4	5	6	7	8	9	Kg/cm2
	Kpa	Kpa	Kpa	Kpa	Kpa	Kpa	Kpa	Kpa	Kpa	Kpa	
0	0.0	98.1	196.1	294.2	392.3	490.4	588.4	686.5	784.6	882.6	0
10	980.7	1078.8	1176.8	1274.9	1373.0	1471.1	1569.1	1667.2	1765.3	1863.3	10
20	1961.4	2059.5	2157.5	2255.6	2353.7	2451.8	2549.8	2647.9	2746.0	2844.0	20
30	2942.1	3040.2	3138.2	3236.3	3334.4	3432.5	3530.5	3628.6	3726.7	3824.7	30
40	3922.8	4020.9	4118.9	4217.0	4315.1	4413.2	4511.2	4609.3	4707.4	4805.4	40
50	4903.5	5001.6	5099.6	5197.7	5295.8	5393.9	5491.9	5590.0	5688.1	5786.1	50
60	5884.2	5982.3	6080.3	6178.4	6276.5	6374.6	6472.6	6570.7	6668.8	6766.8	60
70	6864.9	6963.0	7061.0	7159.1	7257.2	7355.3	7453.3	7551.4	7649.5	7747.5	70
80	7845.6	7943.7	8041.7	8139.8	8237.9	8336.0	8434.0	8532.1	8630.2	8728.2	80
90	8826.3	8924.4	9022.4	9120.5	9218.6	9316.7	9414.7	9512.8	9610.9	9708.9	90
100	9807.0	9905.1	10003.1	10101.2	10199.3	10297.4	10395.4	10493.5	10591.6	10689.6	100

	Kilo pascal to kilogram per square centimeters										
Kpa	0	100	200	300	400	500	600	700	800	900	Kpa
	Kg/cm2	Kg/cm2	Kg/cm2	Kg/cm2	Kg/cm2	Kg/cm2	Kg/cm2	Kg/cm2	Kg/cm2	Kg/cm2	
0	0.000	1.020	2.039	3.059	4.079	5.099	6.118	7.138	8.158	9.177	0
1000	10.197	11.217	12.236	13.256	14.276	15.296	16.315	17.335	18.355	19.374	1000
2000	20.394	21.414	22.433	23.453	24.473	25.493	26.512	27.532	28.552	29.571	2000
3000	30.591	31.611	32.630	33.650	34.670	35.690	36.709	37.729	38.749	39.768	3000
4000	40.788	41.808	42.827	43.847	44.867	45.887	46.906	47.926	48.946	49.965	4000
5000	50.985	52.005	53.024	54.044	55.064	56.084	57.103	58.123	59.143	60.162	5000
6000	61.182	62.202	63.221	64.241	65.261	66.281	67.300	68.320	69.340	70.359	6000
7000	71.379	72.399	73.418	74.438	75.458	76.478	77.497	78.517	79.537	80.556	7000
8000	81.576	82.596	83.615	84.635	85.655	86.675	87.694	88.714	89.734	90.753	8000
9000	91.773	92.793	93.812	94.832	95.852	96.872	97.891	98.911	99.931	100.950	9000
10000	101.970	102.990	104.009	105.029	106.049	107.069	108.088	109.108	110.128	111.147	10000

Torque

Foot pounds to Kilogram meters

	0	1	2	3	4	5	6	7	8	9	ft lbs
	Kg–m	Kg–m	Kg–m	Kg–m	Kg–m	Kg–m	Kg–m	Kg–m	Kg–m	Kg–m	
		0.138	0.276	0.414	0.552	0.690	0.828	0.966	1.104	1.242	
10	1.380	1.518	1.656	1.794	1.932	2.070	2.208	2.346	2.484	2.622	10
20	2.760	2.898	3.036	3.174	3.312	3.450	3.588	3.726	3.864	4.002	20
30	4.140	4.278	4.416	4.554	4.692	4.830	4.968	5.106	5.244	5.382	30
40	5.520	5.658	5.796	5.934	6.072	6.210	6.348	6.486	6.624	6.762	40
50	6.900	7.038	7.176	7.314	7.452	7.590	7.728	7.866	8.004	8.142	50
60	8.280	8.418	8.556	8.694	8.832	8.970	9.108	9.246	9.384	9.522	60
70	9.660	9.798	9.936	10.074	10.212	10.350	10.488	10.626	10.764	10.902	70
80	11.040	11.178	11.316	11.454	11.592	11.730	11.868	12.006	12.144	12.282	80
90	12.420	12.558	12.696	12.834	12.972	13.110	13.248	13.386	13.524	13.662	90
100	13.800	13.938	14.076	14.214	14.352	14.490	14.628	14.766	14.904	15.042	100

Kilogram meters to Foot pounds

	0	1	2	3	4	5	6	7	8	9	Kg–m
	ft–lbs	ft–lbs	ft–lbs	ft–lbs	ft–lbs	ft–lbs	ft–lbs	ft–lbs	ft–lbs	ft–lbs	
		7.230	14.470	21.690	28.930	36.170	43.400	50.630	57.870	65.100	
10	72.300	79.530	86.770	93.990	101.230	108.470	115.700	122.930	130.170	137.400	10
20	144.600	151.830	159.070	166.290	173.530	180.770	188.000	195.230	202.470	209.700	20
30	216.900	224.130	231.370	238.590	245.830	253.070	260.300	267.530	274.770	282.000	30
40	289.200	296.430	303.670	310.890	318.130	325.370	332.600	339.830	347.070	354.300	40
50	361.500	368.730	375.970	383.190	390.430	397.670	404.900	412.130	419.370	426.600	50
60	433.800	441.030	448.270	455.490	462.730	469.970	477.200	484.430	491.670	498.900	60
70	506.100	513.330	520.570	527.790	535.030	542.270	549.500	556.730	563.970	571.200	70
80	578.400	585.630	592.870	600.090	607.330	614.570	621.800	629.030	636.270	643.500	80
90	650.700	657.930	665.170	672.390	679.630	686.870	694.100	701.330	708.570	715.800	90
100	723.000	730.230	737.470	744.690	751.930	759.170	766.400	773.630	780.870	788.100	100

Kilogram meters to newtonmeters

	0	1	2	3	4	5	6	7	8	9	Kg–m
	N–m	N–m	N–m	N–m	N–m	N–m	N–m	N–m	N–m	N–m	
		9.810	19.610	29.420	39.230	49.030	58.810	68.650	78.450	88.260	
10	98.100	107.910	117.710	127.520	137.330	147.130	156.910	166.750	176.550	186.360	10
20	196.200	206.010	215.810	225.620	235.430	245.230	255.010	264.850	274.650	284.460	20
30	294.300	304.110	313.910	323.720	333.530	343.330	353.110	362.950	372.750	382.560	30
40	392.400	402.210	412.010	421.820	431.630	441.430	451.210	461.050	470.850	480.660	40
50	490.500	500.310	510.110	519.920	529.730	539.530	549.310	559.150	568.950	578.760	50
60	588.600	598.410	608.210	618.020	627.830	637.630	647.410	657.250	667.050	676.860	60
70	686.700	696.510	706.310	716.120	725.930	735.730	745.510	755.350	765.150	774.960	70
80	784.800	794.610	804.410	814.220	824.030	833.830	843.610	853.450	863.250	873.060	80
90	882.900	892.710	902.510	912.320	922.130	931.930	941.710	951.550	961.350	971.160	90
100	981.000	990.810	1000.610	1010.420	1020.230	1030.030	1039.810	1049.650	1059.450	1069.260	100

Newtonmeters to Kilogrammeters

	0	10	20	30	40	50	60	70	80	90	N–m
	Kg–m	Kg–m	Kg–m	Kg–m	Kg–m	Kg–m	Kg–m	Kg–m	Kg–m	Kg–m	
0	0.000	1.020	2.040	3.060	4.080	5.100	6.120	7.140	8.160	9.180	0
100	10.200	11.220	12.240	13.260	14.280	15.300	16.320	17.340	18.360	19.380	100
200	20.400	21.420	22.440	23.460	24.480	25.500	26.520	27.540	28.560	29.580	200
300	30.600	31.620	32.640	33.660	34.680	35.700	36.720	37.740	38.760	39.780	300
400	40.800	41.820	42.840	43.860	44.880	45.900	46.920	47.940	48.960	49.980	400
500	51.000	52.020	53.040	54.060	55.080	56.100	57.120	58.140	59.160	60.180	500
600	61.200	62.220	63.240	64.260	65.280	66.300	67.320	68.340	69.360	70.380	600
700	71.400	72.420	73.440	74.460	75.480	76.500	77.520	78.540	79.560	80.580	700
800	81.600	82.620	83.640	84.660	85.680	86.700	87.720	88.740	89.760	90.780	800
900	91.800	92.820	93.840	94.860	95.880	96.900	97.920	98.940	99.960	100.980	900
1000	102.000	103.020	104.040	105.060	106.080	107.100	108.120	109.140	110.160	111.180	1000

Temperature	Fahrenheit to Centigrade				Centigrade to Fahrenheit			
°F	°C	°F	°C		°C	°F	°C	°F
−20	−28.9	95	35.0		−30	−22.0	36	96.8
−15	−26.1	100	37.8		−28	−18.4	38	100.4
−10	−23.3	105	40.6		−26	−14.8	40	104.0
−5	−20.6	110	43.3		−24	−11.2	42	107.6
0	−17.8	115	46.1		−22	−7.6	44	111.2
1	−17.2	120	48.9		−20	−4.0	46	114.8
2	−16.7	125	51.7		−18	−0.4	48	118.4
3	−16.1	130	54.4		−16	3.2	50	122.0
4	−15.6	135	57.2		−14	6.8	52	125.6
5	−15.0	140	60.0		−12	10.4	54	129.2
10	−12.2	145	62.8		−10	14.0	56	132.8
15	−9.4	150	65.6		−8	17.6	58	136.4
20	−6.7	155	68.3		−6	21.2	60	140.0
25	−3.9	160	71.1		−4	24.8	62	143.6
30	−1.1	165	73.9		−2	28.4	64	147.2
35	1.7	170	76.7		0	32.0	66	150.8
40	4.4	175	79.4		2	35.6	68	154.4
45	7.2	180	82.2		4	39.2	70	158.0
50	10.0	185	85.0		6	42.8	72	161.6
55	12.8	190	87.8		8	46.4	74	165.2
60	15.6	195	90.6		10	50.0	76	168.8
65	18.3	200	93.3		12	53.6	78	172.4
70	21.1	205	96.1		14	57.2	80	176.0
75	23.9	210	98.9		16	60.8	82	179.6
80	26.7	212	100.0		18	64.4	84	183.2
85	29.4				20	68.0	86	186.8
90	32.2				22	71.6	88	190.4
					24	75.2	90	194.0
					26	78.8	92	197.6
					28	82.4	94	201.2
					30	86.0	96	204.8
					32	89.6	98	208.4
					34	93.2	100	212.0

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